MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Fact Sheet Amendment, Minor Modification
GP Big Island, VA0003026

TO: Fact Sheet File

FROM: Becky L. France, Environmental Engineer Senior BLF

DATE: August 3, 2010

Reviewed By: Kip D. Foster, Water Permit Manager

Signature: ______________ Date: 8/4/2010

MODIFICATION DESCRIPTION AND RATIONALE:

In accordance with VPDES Permit Regulation 9 VAC 25-31-400, a permit may be modified to correct typographical errors. These corrections do not require public notice. For this modification, typographical errors have been corrected in the Fact Sheet. The equation to calculate the color rise has been revised to more accurately reflect the description of the color rise calculations for outfall 999 in Section 16 (Q). This revision does not result in any changes to the permit.

VPDES PERMIT FACT SHEET

This document gives the pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a major industrial permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq. The discharge results from the operation of a paper mill that produces corrugated paper medium via a semi-chemical process and linerboard from recycled corrugated cardboard. Water quality-based limitations, federal effluent guideline limitations, and best practical judgment (BPJ) limitations have been applied to the facility's discharge.

This permit action consists of removing the total residual chlorine limit for outfalls 001 and 002; removing the whole effluent toxicity testing for outfall 002; reducing the monitoring frequency for temperature and color for outfalls 001 and 002; revising technology based total suspended solids and BOD_5 loading limits for outfall 003; reducing the monitoring frequency for total suspended solids, BOD_5, color and whole effluent toxicity for outfall 003; adding PCB monitoring for process and storm water; revising the storm water monitoring requirements; and updating the special conditions. (Primary SIC Code: 2631 Paperboard Mill)

1. **Facility Name and Address:**
   GP Big Island, LLC
   PO Box 40
   Big Island, VA 24526
   Location: 9363 Lee Jackson Highway (U.S. Route 501)

2. **Permit No. VA0003026** Existing Permit Expiration Date: June 29, 2010

3. **Owner Contact:** Timothy H. Pierce, EH&S Manager, (434) 299-7386, thpierce@gapac.com

4. **Application Complete Date:** February 3, 2010
   Permit Drafted By: Becky L. France Date: April 23, 2010
   (Revised 5/19/10, 5/27/10, 8/3/10)
   DEQ Regional Office: Blue Ridge Regional Office
   Reviewer: Kip D. Foster, Water Permit Manager
   Reviewer's Signature: [signature] Date: 8/4/2010
   Public Comment Period Dates: From 5/21/10 To 6/19/10

5. **Receiving Stream Classification:**

Receiving Streams:	James River; James River UT; Reed Creek; Reed Creek, UT; Thomas Mill Creek, UT
Watershed ID:	VAW-H01R
River Basin:	James River (Upper)
River Subbasin:	NA
Section:	11
Class:	III
Special Standards:	None
Tidal:	No
303(d) Listed:	Yes (PCBs - James River, *E. coli* - Reed Creek)

Outfall	Receiving Stream	River Mile	Latitude	Longitude
001	James River	278.81	37°32'08"	79°21'27'
002	James River	278.77	37°32'04"	79°21'23'
003	James River	277.57	37°31'13"	79°20'46'
005	James River	278.41	37°32'06"	79°21'25'
007	James River	278.65	37°32'02"	79°21'22'
008	James River (Town)	--	37°32'02"	79°21'22'
009	James River	278.59	37°21'00"	79°21'20'
010	James River	278.58	37°31'58"	79°21'19'
012	James River	278.41	37°31'54"	79°21'15'
013	James River	278.33	37°31'53"	79°21'15'
014	James River	278.41	37°31'48"	79°21'14'
015	James River	278.18	37°31'42"	79°21'11'
017	James River	277.97	37°31'39"	79°21'09'
021	James River	278.89	37°32'12"	79°21'32'
027	James River (bypass)	278.82	37°32'08"	79°21'27'
018	Reed Creek to James River	0.01	37°31'28"	79°21'05'
022	James River, UT	0.12	37°32'20"	79°20'53'
023	Thomas Mill Creek, UT	0.28	37°32'30"	79°20'45'
025	James River		37°31'57"	79°21'16'
026	Reed Creek, UT	0.81	37°30'42"	79°21'39'
028	James River, UT	0.34	37°32'20"	79°20'74'

Flow Frequencies for Process/ Cooling Water Outfalls
Attachment A contains a copy of the flow frequency determination memorandum.

Outfall 001

7-Day, 10-Year Low Flow:	309 MGD	7-Day, 10-Year High Flow:	465 MGD
1-Day, 10-Year Low Flow:	236 MGD	1-Day, 10-Year High Flow:	546 MGD
30-Day, 5-Year Low Flow:	388 MGD	Harmonic Mean Flow:	961 MGD

Outfall 002

7-Day, 10-Year Low Flow:	310 MGD	7-Day, 10-Year High Flow:	465 MGD
1-Day, 10-Year Low Flow:	236 MGD	1-Day, 10-Year High Flow:	546 MGD
30-Day, 5-Year Low Flow:	388 MGD	Harmonic Mean Flow:	961 MGD

Outfall 003

7-Day, 10-Year Low Flow:	312 MGD	7-Day, 10-Year High Flow:	549 MGD
1-Day, 10-Year Low Flow:	239 MGD	1-Day, 10-Year High Flow:	468 MGD
30-Day, 5-Year Low Flow:	356 MGD	Harmonic Mean Flow:	964 MGD

6. **Operator License Requirements:** I (industrial WWTP) & IV (STP)

7. **Reliability Class:** II (STP)

8. **Permit Characterization:**

(X)	Private	( )	Interim Limits in Other Document
( )	Federal	( )	Possible Interstate Effect
( )	State	(X)	PVOTW
( )	POTW		

9. **Treatment Provided:** See **Attachment B** for the water flow diagram and **Attachment C** for the site inspection report. Table I below includes the treatment units and flow associated with the discharges. Outfalls 005, 007, 009, 010, and 013 are considered substantially similar outfalls and are therefore referred to cumulatively as outfall 555. A description of the wastewater treatment system is provided below.

Table I
DISCHARGE DESCRIPTION

Outfall No.	Source of Discharge	Treatment (Unit by Unit)	Flow (Max 30-Day Average) MGD
001	Noncontact cooling water (NCCW), AC condensate, hot water tank overflow	None	0.12
002	NCCW from power plant turbine, black liquor evaporator surface condenser, & power plant fan bearings; overflow from wet well	None	3.65
301	Sanitary wastewater	Bar screen, comminutor, surge tank, extended aeration tank, clarifier, tablet chlorinator, chlorine contact tank	0.040 (design)
003	Process wastewater, leaks and spills of black liquor, contaminated storm water (woodyard, coal pile), backwash water; boiler ash sluice water, boiler blowdown; recovery boiler blowdown; cooling and pump seal water; leachate from 2 industrial landfills, treated sanitary wastewater, NCCW from dryer system on paper machines & AC; condensate from AC; overflow from hot water tank	WWTP – screen, primary clarifier, nutrient feed system, equalization basins (2), activated sludge basin, secondary clarifier, polishing pond, subsurface diffuser, sludge-gravity thickener, sludge chemical conditioning, belt filter press	8.76
005	Storm water from mill access road, roof of 1 building adjacent to power plant, truck ramp drain, rail unloading area on back (west) side of plant (0.43 acre)	None	--

Outfall No.	Source of Discharge	Treatment (Unit by Unit)	Flow (Max 30-Day Average) MGD
007	Storm water from parking lot in front of power plant (0.85 acre)	None	--
008	Town of Big Island offsite storm water	None	--
009	Storm water from parking lot around main lift station (1.65 acres)	None	--
010	Storm water from parking lot and main entrance road (0.86 acre)	None	--
012	Storm water from OCC storage pad and truck staging area (7.08 acres)	Sediment trap	--
013	Storm water from roadway, old truck scales, and parking areas (2.52 acres)	None	--
014	Storm water from grassy and paved truck scale area, main road, parking areas, and roof of linerboard facility (1.07 acres)	None	--
015	Storm water from linerboard building roof, railroad tracks west of linerboard building; grassy areas and paved area around linerboard building (15.93 acres)	None	--
017	Storm water from equalization basin area and main access road (2.97 acres)	None	--
018	Storm water from between equalization basins and main entrance (2.76 acres)	None	--
021	Storm water from truck unloading areas and secondary fiber (double lined Kraft - -DLK storage area (0.26 acres)	Baffled sediment basin	--
022	Storm water from Amherst Landfill sediment basin (20.40 acres)	Sediment basin	--
023	Storm water from Amherst Landfill access road (1.80 acres)	None	--
025	Storm water from lowest point on Amherst Landfill access road (10 acres)	None	--
026	Storm water from sediment basin at closed Bedford Landfill (5.0 acres) (permittee completed no exposure certification)	Sediment basin	--

Outfall No.	Source of Discharge	Treatment (Unit by Unit)	Flow (Max 30-Day Average) MGD
027	Flood waters only, bypass from upriver lift station	None	--
028	Storm water from Phase III Amherst Landfill sediment basin (8.28 acres)	Sediment basin	--

A. **Plant Processes and Services**

Material Production Process - Products Manufactured

The GP Big Island mill produces unbleached rolls of corrugated medium and linerboard. The mill operates 24 hours a day, seven days a week and employs approximately 340 employees. Hardwood chips and secondary fiber (recycled waste paper) are used to manufacture paper.

Hardwood chips comprise about 50% of the cellulosic raw material. Old corrugated containers (OCC) are the main source of secondary fiber. Depending on price and availability, double lined Kraft clippings (DLK) from box plants and/or mixed office waste (MOW) may be used instead. OCC arrives by truck and rail. Glass, sand, staples, wire, and other wastes from the recycled fiber are mechanically wound around a rope. The rope with the debris wrapped around, that continually exits the pulper, is referred to as the "ragger tail". The ragger tails are taken to GP's Amherst Landfill. Other impurities are removed by density and are either burned in the Mill's No. 5 boiler or taken to the mill landfill.

Corrugated medium consists of approximately 80% virgin fiber (wood chips) and 20% secondary fiber. The linerboard facility uses 100% secondary fiber. Starch and resizing agents may be added to the linerboard production product as well as silica to the outside.

Material Production Process - Pulp Manufacturing Processes

To make paper, the fibers must be broken down into pulp. Two different processes are employed to make pulp -- semi-chemical process using wood chips and hydropulping of waste paper.

The semi-chemical process consists of digestion by heating hardwood chips with cooking liquor containing sodium carbonate and sodium hydroxide to produce wood pulp. Mechanical plates break the chips down into individual fibers. Water is added and the mixture of fibers, water, and chemicals, or "stock," passes through a three stage countercurrent washer to recover chemicals and clean the stock. After continued refining, the virgin pulp is stored in a machine chest and later mixed with secondary fiber that has been hydropulped.

For the hydropulping process, secondary fiber is mixed with water and beaten in large tanks. This hydropulping process frays the surface of the fibers for better bonding. The fibers are cleaned of debris and softened and stored in a machine chest prior to paper manufacturing.

Unbleached Paper Manufacturing

There are three paper machines (Nos. 1, 3, 4). Depending upon the type of paper being made, secondary fibers and virgin fibers may be mixed together and sprayed onto a forming wire. Water is added to reach approximately 98 percent moisture at the headbox. The fibers travel over a fourdrinier action table to make the fibers orient themselves. The moist pulp is then pressed between felt rollers to remove excess moisture. The sheet becomes stronger as water is pressed out and fibers interlock. The sheet leaves the press section and enters the dryer section where steam heated drums remove most of the remaining water. After this stage, the paper may be coated and then wound onto rolls. Trim waste is recycled in the hydropulper.

Auxiliary Services

Auxiliary operations include power and steam generation, black liquor recovery, and water treatment. There are three boilers (Nos. 4, 5, and 6). Fuel used for these operations includes natural gas, coal, wood chips, sawdust, bark, No. 2 diesel, and OCC rejects. Approximately forty percent of OCC rejects produced are burned. About 15 percent of the facility's electrical demand is supplied by the company's hydroelectric generator and steam generator. Noncontact cooling water from the steam turbine generator, turbine generator condenser, and power plant fan bearings is discharged to outfall 002.

Auxiliary Services: Black Liquor Recovery
Recovered liquor from the digesters contains sodium hydroxide, sodium carbonate, and organic material. Approximately 2 percent of fiber is lost in the liquor. This liquor is concentrated by pre-evaporation followed by multiple-effect evaporation (MEE) to form black liquor which consists of approximately 60 percent solids. This spent black liquor is combusted in a chemical recovery furnace to recover molten sodium carbonate which is redissolved in water to produce new pulping liquor for use in the digesters.

Auxiliary Services: Water Treatment
Approximately 11 million gallons of water is withdrawn per day for industrial process uses. Raw water is used to cool the turbine condensers for the steam electric generator unit and the blow heat evaporating unit for the liquor. Drinking water is supplied by wells.

Raw river water flows through a rotary coarse trommel screen prior to entering a water clarifier. Currently, polymer is not used in the water clarifier. The water is then treated with aluminum sulfate and sodium hydroxide, and the treated water is stored in the north filter tank. Treated water then cools the blow heat evaporator (BHE) and MEE surface condensers. Water that cools the surface condensers is discharged to the warm water tank for use in the paper mill processes. Chlorine and bromine are no longer added to the treated water prior to use in the mill for manufacturing.

The clarifier is periodically backwashed, and the backwash water is discharged to the process sewer and pumped by the main lift station to the equalization basins for treatment by the process wastewater treatment system and ultimate discharge to outfall 003. Surface condenser cooling water is discharged to the warm water tank for use in the paper mill. Overflow from the warm water tank and the north filter tank is discharged to outfall 002.

<u>Auxiliary Services: Sanitary Wastewater Treatment Plant</u>
Sanitary wastewater from the mill employees and approximately 25 residences in the community of Big Island is treated in a 40,000 gpd activated sludge package treatment plant. Wastewater is conveyed to the sanitary wastewater treatment plant via three lift stations. The treatment system consists of an inlet bar screen, comminutor, surge tank, diffused air aeration basin, clarifier, 8,000-gallon aerated sludge holding basin, tablet chlorinator, baffled chlorine contact tank, and v-notched weir with an ultrasonic flow meter.

Final effluent is chlorinated with calcium hypochlorite tablets before discharge to the process equalization basins. Sanitary sludge is pumped from the sludge holding tank as necessary and transported to the Lynchburg Municipal Wastewater Treatment Plant for disposal.

B. **Industrial Wastewater Treatment**

Industrial wastewater consists of approximately 3 MGD from the linerboard mill and OCC recycled facility; 4 MGD from the pulp mill, beater room, and medium mill; and 0.5 MGD from the utilities services (power house, recovery, and evaporator areas) for a total of approximately 7.5 MGD. Wastewater from each of these three areas is pumped to the industrial treatment system (WWTS) by the No. 4 Lift Station, Upriver Lift Station, and Main Lift Station. The Main Lift Station handles wastewater from the utilities and leachate collection system. Contaminated storm water from the wood chip and coal storage areas and various chemical storage areas is also included in the industrial wastewater treatment system via the Main Lift Station. The No. 4 Lift Station handles process wastewater from the No. 4 paper machine and OCC plant. The Upriver Lift Station handles wastewater from the north end of the mill, as well as from the medium and pulp mills. The WWTS works consists of three lift stations, two equalization basins, a primary clarifier, an aeration basin, a secondary clarifier, polishing pond, Parshall flume, foam tower, diffuser, and sludge handling facilities. Refer to **Attachment B** for the water flow diagram.

Primary Clarifier

Process wastewater from the OCC recycled facility, pulp mill, and Nos. 1, 3, and 4 paper machines is pumped via the Upriver and No. 4 Lift Stations to the primary clarifier. The purpose of the primary clarifier is to remove fibers and other solids from the pulp and paper mill effluent streams. A scum arm deposits floating scum in a trough. The scum is conveyed to an inclined dewatering screw conveyor into a hopper which is manually removed for disposal at the mill's existing industrial landfill (Amherst Landfill). A wet well collects water removed from the scum, and this water is pumped back to the clarifier. Oxygen may be added to the clarifier influent to maintain aerobic conditions in the primary treatment area.

Equalization Basins

Wastewater flows via gravity from the primary clarifier and is pumped from the Main Lift Station into one of two equalization basins. The two equalization basins are each one-acre and have a total capacity of 6.8 million gallons. Aerators in the equalization basin may be operated as needed. The effluent from the power area bypasses the primary clarifier and also flows to these basins. The equalization basins treat primary clarifier effluent; raw wastewater from the powerhouse recovery area; storm water from the woodyard, coal pile, and other mill areas; treated sanitary effluent; and leachate from the mill landfill (Amherst Landfill). The Main Lift Station handles waste from the boiler and recovery areas and also storm water that comes in contact with processing and storage areas. The combined effluent from the equalization basins discharges to the aeration basin. Nitrogen and phosphorus are added to the equalization basin effluent prior to mixing with the process wastewater at the inlet to the aeration basin. The nutrient feed rate is optimized to control excess nutrients in the effluent.

Aeration Basin and Secondary Clarifier

Wastewater from the equalization basin is discharged into the extended aeration basin. The aeration basin also receives pressate from the sludge press operations, decanted water from the sludge holding ponds, and leachate from the closed mill landfill (Bedford Landfill). The activated sludge basin covers approximately 5 acres and has a capacity of 20 million gallons. Air is supplied by surface aerators. The effluent from the aeration basin flows into a concrete wet well where three pumps lift the effluent into the above ground secondary clarifier. Polymer may be added as needed to facilitate settling to the secondary clarifier influent from a polymer system located next to the secondary clarifier lift pumps. Sludge is concentrated to approximately 1 to 2 percent solids in the clarifier and then metered to the head of the aeration basin or wasted to the sludge dewatering facility as needed. Overflow from the secondary clarifier gravity flows to the polishing pond.

Polishing Pond
The 15-acre polishing pond has two floating plastic curtains in the pond to prevent short-circuiting. When needed the polishing pond will be dredged, and the sludge will be dewatered for disposal or reuse.

A water-based defoamer is added as needed to the effluent before discharge. Effluent from the polishing pond is discharged through an 18-inch Parshall flume with ultrasonic flow meter to a foam tank. The effluent discharges to a 17 port diffuser that extends into the James River (outfall 003).

C. Outfalls

Outfall 001
- Noncontact Cooling Water
- Hot Water Tank Overflow
- AC Condensate

This wastestream includes Dynamatic dryer drive system noncontact cooling water from the Nos. 1 and 3 paper machines. Noncontact cooling water from the air conditioning system for the mechanical control rooms and hot water tank overflow are also included. River water is no longer chlorinated during the treatment process. The effluent discharges through a Parshall flume with a bubbler flow meter.

Outfall 002
- Noncontact Cooling Water
- Raw Water River Wet Well Overflow

Noncontact cooling water from the power plant steam turbine, black liquor evaporator surface condenser, and power plant fan bearings is included in this outfall. Raw river water is used to cool the steam turbine surface condenser. Also, treated water overflow from the north filter tank and warm water tank (wet well) discharges to this outfall. River water is no longer chlorinated during the treatment process. The effluent discharges through a rectangular weir that is equipped with an ultrasonic flow meter.

Outfall 003
- Process Water
- Noncontact Cooling Water
- Treated Sanitary Wastewater
- Storm Water (OCC pad storage area, coal piles, chip and refuse pile, chemical storage area, various mill areas)
- Miscellaneous: Blowdown Water, Overflows/ Spills

The industrial wastewater treatment system receives process water, noncontact cooling water, treated sanitary wastewater, storm water, and blowdown water. This treatment system discharges to the James River. Outfall 003 is primarily comprised of process water from the pulping and paper manufacturing operations, leachate from two industrial landfill, backwash water from the water treatment process, and boiler ash sluice water.

Internal outfall 301 discharges treated sanitary wastewater from the onsite 0.040 MGD treatment works into this outfall. Contaminated storm water from half of the OCC pad storage area, two coal piles, chip and refuse pile, and chemical storage area is also included in this outfall. Blowdown water from the recovery boiler and three power boilers is included in this waste stream. Treated effluent to this outfall discharges over the weir in the polishing pond and to a diffuser in the James River.

Outfall 555 (Substantially Similar Outfalls 005, 007, 009, 010, 013)
Storm Water (SIC Codes 2631)

- Parking Lot Areas
- Entrance Road
- Loading and Unloading Areas

These outfalls are considered substantially similar outfalls and are sampled as outfall 555. Outfall 005 receives runoff from the loading and unloading areas for the rail and trucks and any overflow from the Main Lift Station. Outfall 007 receives drainage from the parking lot and any overflows from the Main Lift Station. Outfall 009 receives runoff from roadway drainage and potentially from overflow from the Main Lift Station. Storm water runoff from the parking lot and entrance road drains to outfall 010. Outfall 013 drains storm water from the old truck scales area, main road, and parking areas.

Outfall 008 (Offsite Storm Water Outfall)
This outfall discharges storm water from the surrounding Big Island community. It is not associated with industrial activity from GP Big Island.

Outfalls 012 and 021
Storm Water (SIC Code 2631)

- OCC Pad Storage Area (Outfall 012 and Outfall 003) and Truck Staging Area (Outfall 012)
- DLK Clipping Bale Storage and Truck Unloading Dock Areas (Outfall 021)

These outfalls pertain to the storage of recycled material to be used in the manufacturing of paper. Outfall 012 receives storm water from the old corrugated container (OCC) pad storage area. Drainage from approximately 3 acres of the OCC pad is routed to the No. 4 Lift Station and then to the equalization basins for treatment in the industrial wastewater treatment system. To minimize hydraulic loading during significant storm event, the remaining 7 acres of the OCC pad drainage is routed through a sedimentation trap and then to outfall 012. The sedimentation trap removes grit and floatable solids. The truck staging area and roadway also drains to outfall 012.

Outfall 021 drains the truck unloading and the outdoor storage areas for the double lined Kraft (DLK) clippings. The DLK clippings, received in bales, are stored at the north end of the Pulp Mill. A catch basin with a submerged, baffled discharge removes paper scraps from the storm water runoff prior to outfall 021. Storm water from the rail unloading dock and the northern section of the outdoor storage area discharges to the river via sheet flow.

<u>Outfall 014</u>
Storm Water (SIC Code 2631)

- Paved Truck Scales
- Main Road and Parking Areas

This storm water outfall drains the truck scale area, parking area, and main road.

<u>Outfall 015</u>
Storm Water (SIC Code 2631)

- Linerboard Facility Roof
- Railroad Tracks West of Linerboard Facility
- Grassy and Paved Areas around Linerboard Facility

Storm water from the linerboard facility roof and area around the linerboard facility is discharged to outfall 015.

<u>Outfall 017</u>
Storm Water (SIC Code 2631)

- Main Road
- Area around Equalization Basins

This outfall drains surface runoff from the equalization basin area and the main access road.

<u>Outfall 018</u>
Storm Water (SIC Code 2631)

- Area between Equalization Basins and Main Entrance

This outfall drains surface runoff between the equalization basins and the main entrance to the plant.

<u>Outfalls 022, 023, 025, 026, 028 (Industrial Landfill Outfalls)</u>
Storm Water (SIC Codes 2631, 4953)

- Sediment Basin Discharges (Outfalls 022, 026, 028)
- Access Road Discharge (Outfalls 023, 025)

A sediment basin at the facility's Amherst Landfill is discharged to outfall 022. Any leachate from the landfill gravity drains to the Main Lift Station and is discharged into the equalization basins for treatment by the industrial wastewater treatment facility. Another sediment basin at the Amherst Landfill will receive runoff from the new Phase III section of the landfill, and this runoff will be discharged to outfall 028.

Outfall 023 drains the haul road near the Amherst Landfill entrance. Outfall 025 drains the lowest point on the Amherst Landfill haul road.

Storm water from the sediment basin at the closed Bedford Landfill drains to outfall 026. A spring which was classified as leachate from this landfill has been trucked to the sludge ponds and subsequently pumped to the aeration basin or pumped to the main lift station for treatment in the mill's wastewater treatment system. Previously the facility collected discharge from the spring and pumped it to a holding pond. A tanker truck periodically drained and hauled the water from the holding pond to the wastewater treatment facility. No water quality criteria exceedances of the spring water have occurred in the past eight sample events. The final cover has been maintained during the postclosure care period, including reseeding, slope stabilization, and regular site inspections. Since the spring water is not contaminated it will be rerouted to the holding pond and discharged into the stream at outfall 026. This outfall qualifies for a no exposure exemption and GP Big Island has submitted a No Exposure Certification for this outfall. So, this outfall is not subject to storm water monitoring during the 2010 though 2015 permit term.

Outfall 027 (Overflow from Upriver Lift Station)
This outfall is recognized as a bypass. The Upriver Lift Station receives wastewater from the north end of the mill and the medium and pulp mills. Flooding may cause an overflow of this lift station.

10. **Sewage Sludge and Industrial Sludge Use or Disposal:**

Industrial Sludge
Settled solids from the primary and secondary clarifiers are handled by the sludge dewatering system. Equalization basin sludge and dredged solids from the polishing pond are handled with portable presses or other means. The mill's sludge dewatering system includes a sludge press and gravity thickener.

A sludge lift station delivers the sludge to two, 100,000-gallon agitated sludge equalization tanks. Sludge from the tanks is fed to the belt press. A comminutor shreds solids using a rotary cutter inside a screen basket. Polymer is injected into the sludge line after the sludge feed pump to promote flocculation. Then, the sludge is pumped to a gravity thickener where the sludge is ridged and furrowed by a series of plow blades placed along the travel of the belt, allowing the water released from the sludge to pass through the belt. Decanted liquid from the sludge dewatering system is collected in a sump and routed to the aeration basin.

Waste sludge solids drop onto a conveyor where lime may be added when necessary prior to falling into a concrete bunker to improve sludge handling characteristics for landfilling. Drainage from this bunker is routed back to the aeration pond. The sludge is manually removed for disposal in the mill's private onsite industrial landfill (Amherst Landfill). This industrial sludge may also be hauled offsite for use as a soil amendment or other beneficial uses.

The site also has two sludge dewatering lagoons that are only used during maintenance activities or emergencies. The lagoons each have a decant pump which returns the supernatant to the head of the aeration basin. Dried sludge is excavated and transferred to the onsite landfill on an as needed basis. In the future, sludge may be removed for offsite composting and sale or other beneficial reuse.

Sewage Sludge
For sewage sludge there is an 8,000-gallon sludge holding tank. A septic tank hauler transports the contents of this tank approximately 12 times per year. Sewage sludge is disposed of at the City of Lynchburg WWTP.

11. **Discharge Location Description:** The USGS topographic map which indicates the discharges is included in **Attachment B**. The latitude and longitude of outfall 003 are N 37°31'13" and E 79°20'46", respectively.

Name of Topo: Big Island Number: 134D

12. **Material Storage:** Process chemicals are unloaded at the recovery plant, medium mill, power house, wastewater treatment areas (nutrient storage tank, sludge press building), and linerboard mill. Process chemicals are stored in tanks outside the production areas and are associated with the black liquor/fuel oil tank farm, recovery area tank farm, water treatment area, No. 3 paper machine courtyard, linerboard mill tank farm, and wastewater chemical storage areas. A list of materials stored onsite and containment measures is included in **Attachment C**.

Storm water from a portion of the old corrugated container (OCC) pad storage area, two coal piles, chip and refuse pile, and chemical storage areas is routed to the industrial wastewater treatment system before discharge to outfall 003.

Storm water from a portion of the OCC pad storage area is routed through a sediment trap prior to discharge to outfall 012. Storm water from the secondary fiber (DLF) storage area is routed to baffled sediment basin prior to discharge to outfall 021. Storm water from the Amherst Landfill is routed from sediment basins prior to discharging to outfall 022 and outfall 028. The storm water from the closed Bedford Landfill flows through a sediment basin prior to discharging to outfall 026. There is no treatment associated with the other eleven storm water outfalls. GP Big Island has a preventative maintenance schedule, spill prevention procedures, and erosion and sediment control measures to reduce storm water pollutant loadings that are implemented through the facility's Storm Water Pollution Prevention Plan and Best Management Practice section of their Operations and Maintenance Manual.

13. **Ambient Water Quality Information:** Receiving stream classification and 303(d) listing information, bacterial study information, endangered species evaluation information, surface water quality data, ground water data, and flow frequencies for the receiving stream are discussed below.

Points of Interest	River Mile
Upstream STORET Station	282.28
GP Big Island Water Intake	278.82
GP Big Island Outfall 001	278.81
GP Big Island Outfall 002	278.77
GP Big Island Outfall 003	277.57
Downstream STORET Station	275.75
Coleman Falls Dam	274.67
City of Lynchburg Intake	259.39

Water Use Classification

There are three process discharges to the James River, twelve storm water discharges to the James River, and two storm water discharges to unnamed tributaries to the James River. There is a storm water discharge to Reed Creek and a storm water discharge to an unnamed tributary to Reed Creek. There is also a storm water discharge to an unnamed tributary to Thomas Mill Creek. The receiving streams (James River, Reed Creek, and Thomas Mill Creek) are in Section 11 of the Upper James River Basin and subject to Class III water body water standards. GP Big Island discharges into a segment of the James River Watershed (VAW-H01R) as described in the 2004 305(b) Use Attainment Summary Report (**Attachment D**). This segment has been assessed as fully supporting for the aquatic life use. The Virginia Department of Health has issued a fish advisory for a segment of the James River from the Big Island dam downstream to the I-95 bridge in Richmond. This segment of the James River was listed on the 303(d) list for impairment due to PCBs found in fish tissue. A PCB TMDL for this segment of the Roanoke River is expected to be completed by the end of 2016.

The segment of Reed Creek from the headwaters in the Jefferson National Forest to the mouth of Reed Creek on the James River below Big Island has been listed on the 303(d) list for impairment due to *E. coli* exceedances. See **Attachment D** for a copy of the 303(d) listings for these parameters.

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the 2004 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report indicates that 83 percent of the mainstem Bay does not fully support this use support goal under Virginia's water quality assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment. The facility has conducted nitrogen and phosphorus monitoring for this permit and continued this monitoring once covered by a general permit (VAN040066). For 2009, GP Big Island reported an annual total nitrogen loading of 81,410 pounds/year which is below the general permit wasteload allocation of 122,489 pounds/year. For 2009, GP Big Island also reported an annual total phosphorus loading of 5,030 pounds/year which is below the general permit wasteload allocation of 49,658 pounds/year.

Bacterial Study
Dr. Klaus of Virginia Polytechnic Institute performed a study of the bacterial species present in the mill's process effluent. The study identified both *Escherichia coli* and *Klebsiella pneumonia*. Due to concern over impact of *Klebsiella pneumonia* on primary recreational use of the James River downstream of the GP Big Island mill, in 1991 the Virginia Department of Health (VDH) recommended that a site-specific beneficial use-attainability study be performed by the permittee. In their August 1, 1994 letter responding to the VPDES application, the VDH supported conducting a study of microbiological indicators relating to discharges from outfall 003 to gain information for evaluation of future discharge requirements. Copies of VDH memorandums are included in **Attachment D**.

Endangered Species Evaluation
The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has indicated that the freshwater mussel, the Yellow lance, has been documented as a species of concern within the discharge area. According to the Virginia Department of Games and Inland Fisheries (VDGIF), the State Threatened green floater is known in this area. A copy of the Natural Heritage information and the VDGIF information on species of concern in the area of the discharge is included in **Attachment D**.

Receiving Stream Water Quality Data
Chemical monitoring data have been collected upstream and downstream of the discharge point at STORET Stations 2-JMS282.28 and 2-JMS275.75, respectively. All metals data were given in total recoverable form which is not directly comparable with the water quality criteria given in dissolved form. **Attachment E** contains temperature, pH, and hardness STORET data and temperature and pH raw water intake data used in antidegradation wasteload allocations.

Ground Water Data
Two 1-acre equalization basins, a 5-acre aeration basin, a 15-acre polishing pond, and two (6.5 acres total) sludge dewatering lagoons were built in the late 1970s with compacted clay. None of these structures are lined. In 1992, the risk of ground water contamination at this facility was rated among the highest in the DEQ Blue Ridge region of 92 impoundments. The permittee has conducted upgradient and downgradient ground water monitoring in the vicinity of these earthen structures beginning in 1992 to determine if there is any leakage to ground water. Surface water monitoring adjacent to the pond was conducted from 1999 to 2000 and then discontinued since it was of questionable value in detecting leaks from the ponds. There are some ground water data that exceed the ground water standards in upgradient and downgradient wells. There may be some increase in pollutants in some of the downgradient wells. The permittee will be required to conduct a statistical evaluation of the ground water data and a corrective action plan if there is leakage causing a water quality threat to receptors. See **Attachment F** for a summary and discussion of ground water data collected at the facility.

Flow Frequencies
Flow frequencies for outfalls 001, 002, and 003 were determined by using flow frequencies for the gauge on the James River at Holcombs Rock, Virginia (#02025500) downstream of GP Big Island. The flow has been regulated by Gathright Dam at Lake Moomaw since 1979. Coleman Falls Dam is located about 15,312 feet downstream from outfall 002. The flow frequency values at the discharge points were determined by using drainage area proportions and have been reduced by the outfall discharges below and including each discharge point. The flow frequencies for the receiving stream are lower than the previous permit term. **Attachment A** contains a copy of the flow frequency determination memorandum.

14. **Antidegradation Review and Comments**: Tier I _____ Tier II __X___ Tier III _____

The State Water Control Board's Water Quality Standards include an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier I or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier II water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier II waters is not allowed without an evaluation of the economic and social impacts. Tier III water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with Tier determination. This segment of the James River (VAW-H01R) is listed on Part I of the 303(d) list for PCBs in fish tissue. However, according to Agency guidance, fish tissue analysis and metals in sediments are not a basis for classifying a receiving stream as Tier I. There are no water monitoring data to indicate that this segment does not meet water quality criteria. Therefore, this segment is determined to be a Tier II waterbody, and no significant degradation of existing water quality is allowed.

For purposes of aquatic life protection in Tier II waters, "significant degradation" means that no more than 25 percent of the difference between the acute and chronic aquatic criteria values and the existing quality (unused assimilative capacity) may be allocated. For purposes of human health protection, "significant degradation" means that no more than 10 percent of the difference between the human health criteria and the existing quality (unused assimilative capacity) may be allocated. The antidegradation baseline for aquatic life and human health are calculated for each pollutant as follows:

Antidegradation baseline (aquatic life) = 0.25 (WQS – existing quality) + existing quality

Antidegradation baseline (human health) = 0.10 (WQS – existing quality) + existing quality

Where:
"WQS" = Numeric criterion listed in 9 VAC 25-260-5 et seq. for the parameter analyzed
"Existing quality" = Concentration of the parameter being analyzed in the receiving stream

The GP Big Island's facility was built in 1891 prior to the antidegradation policy requirements set forth in the Clean Water Act. The antidegradation requirements apply to existing uses attained after November 28, 1975. Therefore, antidegradation baselines only apply if the facility has expanded or significantly increased the discharge. In 1996, GP Big Island completed an expansion with the addition of a new recycled fiber facility (secondary fiber non-deink) and a new linerboard and corrugating medium machine.

For outfall 002, the application for the 1994 reissuance indicated a 30-day maximum of 6.0 MGD. For the 2000 permit, the application indicated an increase to 7.22 MGD. Antidegradation baselines are needed for the increase in flow following the expansion in 1996.

For outfall 001, the application for the 1994 reissuance indicated a 30-day maximum of 0.50 MGD. For the 2000 permit, the application indicated a decrease to 0.42 MGD. The flow decreased because the permittee began reusing of some of the cooling water in plant processes. Outfalls 001 and 002 appear to be about 600 feet apart and are within an overlapping mixing zone. Since the total flow for outfall 001 and 002 increased in the 2000 permit reissuance, antidegradation baselines for outfall 001 are also needed for the combined increase in flow following the expansion in 1996.

For outfall 003, the application for the 1994 permit reissuance indicated a 30-day maximum of 6.3 MGD. For the 2000 permit, the application indicated an increase to 7.97 MGD. Antidegradation baselines are needed for this increase in flow following the expansion in 1996.

Stream and effluent data used in the antidegradation wasteload spreadsheet calculations are included in **Attachment E** and **Attachment G**, respectively. Hardness upstream data from STORET Station 2-JMS282.28 and raw intake pH and temperature values have been used to calculate the wasteload allocations for the process outfalls. A summary of instream and effluent 90th percentile values is included in **Attachment J**.

The "existing" background concentrations for all parameters, except ammonia, were set to zero. Downstream ammonia data collected from STORET Station JMS275.75 prior to the 1996 expansion from STORET Station were entered into the STANDARDS program to determine the expected value. The program output expected value indicates the existing ammonia concentration predicted prior to the expansion during chronic conditions. To predict the existing background concentration prior to the expansion during acute conditions, effluent data prior to the expansion were adjusted to reflect 5:1 dilution ratio concentrations in the receiving stream. These calculated instream ammonia concentrations were entered into the STANDARDS program to determine the expected value for the receiving stream during acute conditions. The program output expected value indicates the existing ammonia concentration predicted prior to the expansion during acute conditions. See **Attachment E** for a copy of the expected value calculations.

The existing background ammonia concentration during acute conditions (0.288 mg/L) and the background ammonia concentration during chronic conditions (0.055 mg/L) were entered into antidegradation spreadsheets to calculate the antidegradation baselines. The spreadsheets include only one input for background concentration for each parameter. The ammonia data were not evaluated under high flow conditions. So, the acute background concentration was entered for the yearly ammonia parameter and the chronic background concentration was entered for the chronic high flow ammonia parameter. Also, the low flow frequencies and mixing information were entered for wet season flows. The ammonia acute antidegradation baseline was 11 mg/L (listed as ammonia-yearly) and the chronic antidegradation baseline was 21 mg/L (listed as ammonia-high flow). Since the existing background concentrations for the other parameters were set to zero, there were no other modifications in the calculations of the other antidegradation baselines. **Attachment J** includes the antidegradation baselines for outfalls 001, 002, and 003.

When applied, these antidegradation baselines become the new water quality criteria for this Tier II water. Effluent limits in this permit have been written to maintain the antidegradation baselines for each pollutant. The permit limits are in compliance with antidegradation requirements set forth in 9 VAC 25-260-30.

15. **Site Inspection:** Date: 10/08/09 Performed by: Becky L. France
Attachment C contains a copy of the site inspection report. The last technical and laboratory inspection which included outfalls 003 and 301 was conducted by Ryan L. Hendrix on April 2, 2009. The last technical inspection of the storm water outfalls was conducted by Gerald A. Duff on May 20, 2009. A copy of the compliance inspection reports are found in the DEQ inspection file.

16. **Effluent & Storm Water Screening and Limitation Development:**

Effluent Screening Procedures
DEQ Guidance Memorandum 00-2011 was used in developing all water quality based limits pursuant to water quality standards (9 VAC 25-260-5 et seq). Effluent data used in the calculation of the 90th percentile values for temperature, pH, and hardness are included in **Attachment G**. Refer to **Attachment J** for the antidegradation wasteload allocation spreadsheets and effluent limit calculations.

Process water from the paper mill and is therefore subject to the Federal Effluent Guidelines for Pulp, Paper, and Paperboard Point Source Categories (40 CFR 430). Refer to **Attachment J** for the applicable federal effluent guidelines. Best practical effluent limitations have been developed for noncontact cooling water. See Table II on pages 58-73 for a summary of effluent limits and monitoring requirements.

Storm Water Screening Procedures for Discharge Monitoring Report Requirements
There are 36.4 acres of drainage area to industrial storm water outfalls at the main facility and 40.5 acres of drainage area to storm water outfalls associated with the Amherst Landfill for GP Big Island. All permits that authorize storm water discharges associated with industrial activity must include storm water management provisions. There are no activities requiring effluent limitations on storm water discharges. In accordance with the Storm Water General Permit Regulation, 9 VAC 25-151-10 et seq., industrial sector specific monitoring requirements and a

Storm Water Pollution Prevention Plan (SWPPP) have been required for this facility. Sector B, L, and O requirements have been applied to this facility.

Sector specific monitoring requirements are applied to the outfalls unless representative storm water data indicate conclusively that a parameter is not present in the storm water runoff. All outfalls at the main facility are considered to be subject to industrial sector specific monitoring requirements for the steam electric generating sector O due to the potential for air borne pollutants in the storm water. Sector O includes storm water monitoring for total recoverable iron. Air emission data from the boilers indicate the presence of metals. Data collected for copper and zinc have been evaluated to determine the need for continued metals monitoring. These parameters are considered more specific to the site than total recoverable iron. Therefore, total recoverable iron monitoring has not been required for these storm water outfalls at the main facility. Storm water data submitted during the permit term and with the VPDES permit application have been evaluated to determine if additional monitoring is needed, and a summary of these data are found in **Attachment G.**

Guidance Memo 96-001 recommends that chemical-specific water quality-based limits not be placed on storm water outfalls at this time because the methodology for developing limits and the proper method of sampling is still a concern and under review/evaluation by EPA. Exceptions would be where a VPDES permit for a storm water discharge has been issued that includes effluent limitations (backsliding must be considered before these limitations can be modified) and where there are reliable data, obtained using sound, scientifically defensible procedures, which provide the justification and defense for an effluent limitation. Therefore, in lieu of limitations, pollutants are assessed against screening criteria developed solely to identify those pollutants that should be given special emphasis during development and assessment of the Storm Water Pollution Prevention Plan (SWPPP).

The screening criteria are established as the most stringent of either (1) two times the applicable pollutant's acute criterion, or (2) the pollutants wasteload allocation, on the basis of the discharge going to a large receiving stream and utilizing conservative assumption (i.e., Tier 2) or, where applicable, (3) the pollutant's benchmark monitoring concentration as contained in DEQ's VPDES general permit for storm water from industrial activity. Any storm water outfall effluent data submitted by the permittee that contained pollutants at or above the established screening criteria triggered the need for monitoring of that specific pollutant in Part I.A of the permit for that outfall. The screening criteria are then utilized in the permit as a comparative value. Based on the above criteria, monitoring has been established for the pollutants noted in the table below.

Pollutant of Concern	Screening Criteria	Basis for Criteria	Source
BOD_5	30 mg/L	DEQ benchmark	1
COD	120 mg/L	DEQ benchmark	2
Total Suspended Solids	100 mg/L	DEQ benchmark	3
Nitrate plus Nitrite	1.76 mg/L	NAPD Program Mean	4

Pollutant of Concern	Screening Criteria	Basis for Criteria	Source
Copper, Total Recoverable	18 μg/L	DEQ benchmark	5
Iron, Total Recoverable	1.0 mg/L	DEQ benchmark	6
Zinc, Total Recoverable	120 μg/L	DEQ benchmark	5

Sources used by DEQ to establish analytical monitoring benchmark concentration values:

1. Secondary Treatment Regulations (40 CFR 133)
2. Factor of 4 times BOD_5 concentration - North Carolina benchmark
3. National Urban Runoff Program (NURP) median concentration
4. The DEQ benchmark value from the VPDES Permit Manual is 0.68 mg/L for nitrate plus nitrite which is equal to the median concentration from the EPA's National Urban Runoff Program. Data from the National Atmospheric Deposition (NAPD) Program indicates that nitrate from rainfall in the vicinity of coal fired boilers will exceed this benchmark value most of the time. The precipitation-weighed mean of all nitrate data collected in this program for the past 5 years is 1.08 mg/L. For this permit, the screening criteria for nitrate plus nitrite is equal to a new site specific benchmark which will be NAPD Program mean plus the mean from the urban runoff study median or a total of 1.76 mg/L.
5. Virginia Water Quality Standards, 9 VAC 25-260-140
6. "EPA Recommended Ambient Water Quality Criteria." Chronic Aquatic Life Freshwater (EPA-822-R-02-047; November 2002-CCC)

Annual monitoring is required for all parameters exceeding the DEQ benchmark levels. Quarterly monitoring may be required when data reported for a specific pollutant meet or exceed two times the acute criteria. The DEQ benchmarks for metals are given in total recoverable form, and the storm water criteria are given in dissolved form.

The storm water monitoring data shall be used as a tool to tailor the SWPPP to the site. The Plan should address identifying sources of the pollutants and initiate procedures to reduce any pollutants at or above the screening criteria. The effectiveness of the SWPPP will be measured against these criteria for the parameters. If the concentration of the pollutants in the discharge is below the screening criteria it is assumed the SWPPP is effective.

Storm Water Screening Procedures for PCB Monitoring Study Special Condition (Part I.C.20)

Guidance Memo 09-2001 indicates that PCB testing should be considered for outfalls associated with SIC Codes 2631 and 4911. The permittee has provided a list of outfalls where materials have been or are located that can sometimes contain PCBs and this information is found in **Attachment C**. Transformers are found in the drainage areas of outfalls 012, 015, and 017. A transformer was removed from the drainage area of outfall 009 approximately two or three years ago. While the permittee does not have any information to suspect that any of these transformers contain PCBs, sampling is needed to establish the presence or absence of PCBs. In the case where the transformer was removed, storm water PCB monitoring will determine if there are detectable PCB residuals in the storm conveyance system that might be mobilized with storm events. In accordance with the Guidance Memo 09-2001, two wet weather samples shall be required for each of the storm water outfalls. If PCBs are not detectable using EPA Method 1668 for the first sample, the permittee may be exempted from the second wet weather sampling event on a storm water outfall by outfall basis. This exemption is consistent with Guidance

Memo 09-2008 which allows exemption from storm water monitoring where the pollutant is not present in the discharge.

A. **Mixing Zones**

The MIXER program was run to determine the percentage of the receiving stream flow for outfall 001 and outfall 002 that could be used in the wasteload allocation calculations. The program output for outfall 001 indicated that 48.8 percent of 7Q10 and 0.8 percent of the 1Q10 may be used to calculate acute and chronic antidegradation wasteload allocations. The program output for outfall 002 indicated that 49.45 percent of the 7Q10 and 0.81 percent of the 1Q10 may be used to calculate acute and chronic antidegradation wasteload allocation. A copy of the printout from the MIXER run is included in **Attachment I.**

In December of 1998, a 17-port diffuser was installed at outfall 003. The diffuser has 30-inch long nozzles and a main pipe that is partially buried. See **Attachment I** for details on the diffuser, CORMIX model (Version 3.20) output, and results of the mixing zone study. The CORMIX model output indicates acute and chronic dilution factors of 11:1 and 21:1, respectively. The mixing zone study indicated that the dilution factors are adequate.

A thermal mixing zone study as performed by GP Big Island in 1992 to define the volume of the James River downstream of the discharges which exceeded the temperature Water Quality Standards. The BTU limit as set at 110% of the maximum calculated during the study period of 1992 through August 1994. The maximum boundaries of the thermal mixing zone are 32 feet from the shore, 60 feet downstream, and 20 feet upstream. See **Attachment I** for more details regarding the thermal mixing zone.

B. **Outfall 001 and Outfall 002 (Cooling Water)**

Outfalls 001 and 002 appear to be about 600 feet apart. The one hour travel at velocity from the MIXER program is much greater than the distance between the two outfalls. Therefore the outfalls are assumed to overlap.

Flow -- The table below indicates that there has been an increase in the 30-day maximum flow for outfall 001 and a decrease in the 30-day maximum flow for outfall 002 since the reissuance in 2005. The discharge of cooling water from these outfalls has decreased from the 2005 reissuance application from 4.97 MGD to 3.77 MGD. Flow is to be measured 1/week for outfall 001 and 5 days/week for outfall 002. The sample type and frequencies are unchanged from the previous permit.

Outfall 001

Date Application Received	Action - Date	Maximum Daily Flow (MGD)	30-day Maximum Average Flow (MGD)	Long Term Average Flow (MGD)
6/6/94	Reissuance - 11/30/94	1.1	0.5	0.2
6/3/99	Reissuance - 6/29/00	0.66	0.42	0.24
5/27/05	Reissuance - 6/29/05	0.285	0.034	0.010
12/28/09	Reissuance - 6/29/10	0.22	0.12	0.06

Outfall 002

Date Application Received	Action - Date	Maximum Daily Flow (MGD)	30-day Maximum Average Flow (MGD)	Long Term Average Flow (MGD)
6/6/94	Reissuance 11/30/94	8.8	6.0	4.7
6/3/99	Reissuance 6/29/00	10.20	7.22	5.93
5/27/05	Reissuance 6/29/05	8.38	4.94	4.22
12/28/09	Reissuance 6/29/10	6.23	3.65	2.48

pH -- The pH limits of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limits are based upon the water quality criteria in 9 VAC 25-260-50 for Class III receiving waters. Monitoring 1/week for outfall 001 and 5 days/week for outfall 002 using grab samples has been continued from the previous permit.

BOD_5, intake BOD_5 -- These parameters are reported so that the total BOD_5 loading for this facility may be calculated and reported on outfall 999. Monitoring 1/week using 24-hour composite samples for outfalls 001 and 002 has been continued from the previous permit. The total BOD_5 load for the intake water may be subtracted from the BOD_5 contributions from the outfalls.

Total Residual Chlorine -- Raw water is no longer treated with sodium hypochlorite. Therefore, the previous limits for chlorine are no longer necessary and have been removed. In accordance with 9 VAC 31-220 L.2.a, backsliding on a limit is allowed when material and substantial alterations or additions to the permitted facility occurred after the permit issuance which justify the application of a less stringent limitation.

Temperature, Heat Rejected -- Temperature monitoring has been continued from the previous permit because this parameter is needed to calculate the heat rejected limit for outfall 999.

Cooling water discharges have decreased from a 30-maximum average of 4.97 MGD for the 2005 reissuance to a 30-maximum average of 3.77 MGD for the 2010 reissuance. Since data for the heat rejected limit were significant below the limit, the monitoring frequency has been reduced. The temperature monitoring frequency for outfalls 001 and 002 has been reduced from 5 days/week to 2 days/week. See **Attachment H** for a compilation of discharge data and discussion of reduced monitoring.

The heat rejected value shall be calculated from the temperature monitoring data for outfall 001 and 002 and reported 1/month. BTUs should be calculated from effluent flow (Qe), effluent temperature (Te), and river intake temperature (Tr) as follows:

$$\frac{BTU}{hr} = Qe\ \frac{gal}{day} \times \frac{1\ gram}{cm^3} \times \frac{28317\ cm^3}{7.4805\ gal} \times \frac{1\ BTU}{252\ calorie} \times \frac{1\ day}{24\ hr} \times (Te - Tr)^{o}C$$

$$\frac{BTU}{hr} = 0.6259\ Qe(Te-Tr)$$

Color -- Color monitoring for outfalls 001 and 002 using 24-hour composite samples has been continued from the previous permit. To account for all discharges, the color rise for these outfalls and outfall 003 is included as outfall 999. Since the color data were significantly below the limit for outfall 999, the monitoring frequency has been reduced. The color monitoring frequency for outfalls 001 and 002 has been reduced from 5 days/week to 1/week. See **Attachment H** for a compilation of discharge data and discussion of reduced monitoring.

Whole Effluent Toxicity (WET) -- Outfalls 001 and 002 consist of noncontact cooling water. Chlorine and bromine are no longer added to these outfalls. For these outfalls, there were no toxic pollutants identified on the VPDES permit application that were above the quantification level. For outfall 001, the facility completed five valid acute toxicity testing events. The data have been evaluated to determine if a WET limit is needed. The WETLIM spreadsheet generated an acute wasteload allocation which was input into the STATS program with the quantifiable testing data to determine if there is a reasonable potential to exceed the wasteload allocation. The program output indicates that a limit is not needed. The LC_{50} values were all >100 percent. Since the outfall consists of cooling water, the flow is a very small percentage of the instream flow, and toxicity was not observed in any of the samples, no further toxicity testing will be required. Toxicity testing data for outfall 001 were evaluated for the 1999 reissuance and the toxicity testing requirement was discontinued for the same reasons given above for outfall 002. See **Attachment K** for a summary of toxicity testing data for outfall 002.

C. **Outfall 003 (Process Water, Coal Pile Runoff, Storm Water)**

This outfall receives process water from the paper mill and is therefore subject to the Federal Effluent Guidelines for Pulp, Paper, and Paperboard Point Source Categories (40 CFR 430). Subpart F applies to discharge from the production from paper machines No. 1 and 3 which produce corrugated medium. Subpart J- Secondary Fiber Non-Deink Subcategory applies to discharge from the production from paper machine No. 4 which produces linerboard. Loading limits for BOD_5, TSS, and pH limits are defined by these federal effluent guidelines. In cases where an effluent limit is required by the federal guidelines and to protect water quality, the most stringent limit for a given parameter is applied. A copy of the applicable federal effluent guidelines is included in **Attachment J**.

There are also numeric effluent limitation guidelines for coal pile runoff associated with the steam electric generating facilities (40 CFR 423.12). The discharge from the coal pile is combined with process waste streams and then treated in the industrial wastewater water treatment system. The pH and total suspended solids effluent guideline limitations for this coal pile runoff are applied after the treatment system (at outfall 003). A copy of the coal pile federal effluent limitation guidelines is included in **Attachment J**.

(1) Technology/Federal Effluent Guideline Based Limits and Monitoring

Flow -- The previous permit requirement for continuous flow monitoring has been continued. The table below compares the maximum daily flow, long term averages, and 30-day maximum averages submitted on the VPDES permit reissuance applications. The 30-day maximum average flow has increased from the previous permit term. The 30-day maximum average flow of 8.76 MGD given for the 2010 reissuance was used in the wasteload allocation calculations for this permit.

Outfall 003

Date Application Received	Action - Date	Maximum Daily Flow (MGD)	30-day Maximum Average Flow (MGD)	Long Term Average Flow (MGD)
6/6/94	Reissuance 11/30/94	8.3	6.3	6.1
6/3/99	Reissuance 6/29/00	10.90	7.97	7.18

Date Application Received	Action - Date	Maximum Daily Flow (MGD)	30-day Maximum Average Flow (MGD)	Long Term Average Flow (MGD)
1/31/03	Form 2C revision -- added steam reformer blowdown	10.994	8.064	7.274
5/27/05	Reissuance 6/29/05	11.19	7.67	6.96
12/28/09	Reissuance 6/29/10	11.06	8.76	7.84

pH -- The pH limitations of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. The limits are based upon the Federal Effluent Guidelines for Pulp, Paper, and Paperboard Point Sources (40 CFR 430). These limitations are also in accordance with the Water Quality Standards in 9 VAC 25-260-50 for this Class III receiving stream. Grab samples shall continue to be collected 5 days/week.

Total Suspended Solids (TSS) -- The federal effluent guidelines for coal pile runoff from electric generating facilities (40 CFR 423.12) include a concentration limit. However, the coal pile runoff and process water from the paper mill operation are treated by the wastewater treatment system. The TSS effluent load limitations are a maximum monthly average of 6,177 kg/day and a maximum daily average of 12,206 kg/day. These data shall continue to be collected via 24-hour composite samples. Monitoring data for TSS was significantly below the limitations, so the monitoring frequency has been reduced from 5 days/week to 1/week. See **Attachment H** for a summary of discharge data and discussion of reduced monitoring.

The permit loading limitations for TSS limits are based on requirements of the applicable federal effluent guidelines (40 CFR 430) and have increased compared to the previous permit because of an increase in production. A discussion of how the TSS loading limits were derived follows.

The best practical control technology currently available (BPT) and best available technology economically achievable (BAT) effluent limitations for TSS are applied for paper machines Nos. 1 and 3 because the source was constructed before promulgation of the federal guidelines in 1982. These machines produce corrugating medium using the semi-chemical process. The process wastewater effluent limitations from the federal guidelines are based on production, and the average production rate reported in the application is 898 tons/day for paper machine Nos. 1 and 3. The following limitations for TSS from 40 CFR Part 430, Subpart F, apply to the discharge from paper machines Nos. 1 and 3:

$$\text{30-Day Avg.} = \frac{5.5 \text{ lbs. TSS}}{1000 \text{ lbs. product}} \times \frac{898 \text{ tons product}}{\text{day}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{0.4536 \text{ kg}}{\text{lb.}} = 4481 \text{ kg/day}$$

$$\text{Daily Max.} = \frac{11.0 \text{ lbs. TSS}}{1000 \text{ lbs. product}} \times \frac{898 \text{ tons product}}{\text{day}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{0.4536 \text{ kg}}{\text{lb.}} = 8961 \text{ kg/day}$$

Paper machine No. 4 uses recycled pulp produced by hydraulic and mechanical breakdown of old corrugated containers (OCC) for use as a corrugating medium. The discharge from paper machine No. 4 is subject to 40 CFR 430, Subpart J – Secondary Fiber Non-Deink Subcategory, Corrugating Medium Subdivision. Paper machine No. 4 is a "new source" because it was constructed and began discharging after promulgation of the federal effluent guidelines. The effluent limitations from the federal guidelines are based on production, and the average production rate reported in the application is 813 tons/day. The following new source performance standards (NSPS) limitations from Subpart J for TSS apply to the discharge from paper machine No. 4:

$$\text{30-Day Avg.} = \frac{2.3 \text{ lbs. TSS}}{1000 \text{ lbs. product}} \times \frac{813 \text{ tons product}}{\text{day}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{0.4536 \text{ kg}}{\text{lb.}} = 1696 \text{ kg/day}$$

$$\text{Daily Max} = \frac{4.4 \text{ lbs. TSS}}{1000 \text{ lbs. product}} \times \frac{813 \text{ tons product}}{\text{day}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{0.4536 \text{ kg}}{\text{lb.}} = 3245 \text{ kg/day}$$

The combined federal effluent guidelines TSS limitations for outfall 003 are the sum of the mass loading (kg/day) limitations for paper machines Nos. 1, 3, and 4. The TSS limitations specified by Federal Effluent Guidelines are as follows:

30-Day Avg. = 4481 kg/day (Machines 1 & 3) + 1696 kg/day (Machine 4) = 6177 kg/day Total TSS

Daily Max. = 8961 kg/day (Machines 1 & 3) + 3245 kg/day (Machine 4) = 12,206 kg/day Total TSS

Color -- Color monitoring using 24-hour composite samples has been continued from the previous permit. To account for all discharges, the color rise for this outfall and outfalls 001 and 002 are included as outfall 999. The technology based color rise limit of 70 PCU for outfall 999 shall be continued from the previous permit. A discussion of the basis for the color rise limit is included under outfall 999. Monitoring data for color were significantly below the limitations, so the monitoring frequency has been reduced from 5 days/week to 1/week. See **Attachment H** for a summary of discharge data and discussion of reduced monitoring.

Water Quality Based Limits and Monitoring: The discharge must be evaluated to determine whether there is a reasonable potential for the effluent to violate the water quality standards (WQSs) adopted by the State Water Control Board

(9 VAC 25-260 et. seq). Toxic pollutants data given on the application for which water quality criteria were above the quantification level for ammonia and *E. coli*, and these data have been summarized in **Attachment G.**

Ammonia as Nitrogen -- The water quality criteria and AWLAs for ammonia were calculated and are included in the spreadsheet in **Attachment J.** The acute and chronic AWLAs and the effluent data for ammonia were input in the Agency's STATS program to determine if limits were necessary. The program outputs indicated that limits are not necessary for ammonia. A copy of the STATS program output is included in **Attachment J.**

Fecal Coliform, *E. coli* -- Two fecal coliform data points reported for the reissuance application were significantly above the water quality criteria. These outfall 003 data were taken below the polishing pond, and wildlife may have contributed to these high numbers. So, additional samples were taken from below the secondary clarifier and at outfall 003 to determine whether the wildlife may be contributing to exceedances of the *E. coli* quality criteria. Samples taken from outfall 003 were lower than the samples taken from the secondary clarifier. The *E. coli* data were below the water quality criteria. See **Attachment G** for a summary of *E. coli* data.

In the development document for effluent limitations for this industrial category EPA felt that chemicals used in disinfection of pulp mill process wastewater would result in greater instream problems than the discharge of coliforms. Sanitary wastewater, internal outfall 301, must be thoroughly disinfected prior to entering the process wastewater system to prevent introduction of pathogens into process wastewater which is warm and rich in organics.

PCBs -- PCBs were not detected in the outfall 003 sample taken on November 3, 2009 or analysis completed in 2005. These results represent laboratory detection limits of no less than 0.97 µg/L. For the development of a PCB TMDL, an EPA method capable of detecting PCB congeners at the picogram level is needed. Guidance Memo 09-2001 indicates that PCB testing should be considered for outfalls associated with SIC Codes 2631 and 4911. One dry weather sample and one wet weather sample will be required for outfall 003. See the PCB Monitoring Study Special Condition (Part I.C.20) for details on PCB monitoring requirements for this outfall and four storm water outfalls.

BOD_5 -- The BOD_5 effluent limitations are a monthly average concentration of 2105 kg/day and a maximum daily average of 4210 kg/day, and these limitations have been continued from the previous permit. The permit limitations for BOD_5 limits are based on a comparison of the water quality requirements with the applicable federal effluent guidelines which have increased compared to the previous permit because of an increase in production. The production from paper machine No. 4 has been added to the loading limits. These values have been compared with the Water Quality Management Plan values and the more stringent limits included in the permit. A discussion of how the BOD_5 limits were derived follows. The monitoring data for BOD_5 were significantly below the limitations so the monitoring frequency has been reduced from 5 days/week to 1/week. See **Attachment H** for a summary of discharge data and discussion of reduced monitoring.

Federal Effluent Guideline Calculations

The best practical control technology currently available (BPT) and best available technology economically achievable (BAT) effluent limitations for BOD_5 are applied for paper machine Nos. 1 and 3 before promulgation of the federal guidelines in 1982. The process wastewater effluent limitations from the federal guidelines are based on production, and the average production rate reported in the application is 898 tons/day for paper machine Nos. 1 and 3. The following limitations for BOD_5 from 40 CFR Part 430, Subpart F, apply to the discharge from paper machines Nos. 1 and 3:

$$\text{30-Day Avg.} = \frac{4.35 \text{ lbs. } BOD_5}{1000 \text{ lbs. product}} \times \frac{898 \text{ tons product}}{\text{day}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{0.4536 \text{ kg}}{\text{lb.}} = 3544 \text{ kg/day}$$

$$\text{Daily Max.} = \frac{8.7 \text{ lbs. } BOD_5}{1000 \text{ lbs. product}} \times \frac{898 \text{ tons product}}{\text{day}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{0.4536 \text{ kg}}{\text{lb.}} = 7088 \text{ kg/day}$$

Paper machine No. 4 uses recycled pulp produced by hydraulic and mechanical breakdown of old corrugated containers (OCC) for use as a corrugating medium. The discharge from paper machine No. 4 is subject to 40 CFR 430, Subpart J – Secondary Fiber Non-Deink Subcategory, Corrugating Medium Subdivision. Paper machine No. 4 is a "new source" because it was constructed and began discharging after promulgation of the federal effluent guidelines. The effluent limitations from the federal guidelines are based on production, and the production rate reported in the application is 813 tons/day. The following new source performance standards (NSPS) limitations from Subpart J for BOD_5 apply to the discharge from paper machine No. 4:

$$\text{30-Day Avg.} = \frac{2.1 \text{ lbs. } BOD_5}{1000 \text{ lbs. product}} \times \frac{813 \text{ tons product}}{\text{day}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{0.4536 \text{ kg}}{\text{lb.}} = 1549 \text{ kg/day}$$

$$\text{Daily Max.} = \frac{3.9 \text{ lbs. } BOD_5}{1000 \text{ lbs. product}} \times \frac{813 \text{ tons product}}{\text{day}} \times \frac{2000 \text{ lbs}}{\text{ton}} \times \frac{0.4536 \text{ kg}}{\text{lb.}} = 2876 \text{ kg/day}$$

The combined federal effluent guidelines BOD_5 limitations for outfall 003 are the sum of the mass loading (kg/day) limitations for paper machines Nos. 1, 3, and 4. The BOD_5 limitations specified by Federal Effluent Guidelines is as follows:

30-Day Avg. = 3544 kg/day (Machines 1 & 3) + 1549 kg/day (Machine 4) = 5093 kg/day Total BOD_5

Daily Max. = 7088 kg/day (Machines 1 & 3) + 2876 kg/day (Machine 4) = 9964 kg/day Total BOD_5

Water Quality Management Plan Limitations

The Water Quality Management Plan (WQMP) (James River Basin 9 VAC 25-720-60 B) sets forth measures to be taken by the State Water Control Board for attaining and maintaining applicable water quality goals for the James River Basin. GP Big Island's wasteload allocation (WLA) for BOD_5 pollutants discharged to the James River is 4640 lb BOD_5/day (2105 kg BOD_5/day). Because the BOD_5 allocation contained in the WQMP is more stringent than the applicable federal effluent guidelines, limitations based on the WQMP are included in the permit. The permit limitations based on the WQMP are a maximum 30-day average of 2105 kg BOD_5/day and a maximum daily value of 4210 kg BOD_5/day. **Attachment D** includes supporting information from the WQMP for this segment of the Upper James River Basin.

Temperature (effluent and upstream) and upstream pH -- A thermal mixing zone study was performed by the company in 1992 to define the volume of the river which exceeded the temperature criteria. The BTU limit was set at 110 percent of the maximum calculated during the study period of 1992 through August 1994. The maximum boundaries of the thermal mixing zone are 32 feet from the shore, 60 feet downstream and 20 feet upstream. Due to the construction of the diffuser, the temperature of the effluent plume is expected to be dissipated rapidly and an increase in the river's temperature downstream from the diffuser is not expected. Therefore, temperature and heat load limits do not appear to be necessary for outfall 003.

Upstream pH and temperature monitoring has been continued because these parameters are necessary to calculate the ammonia criteria. The monitoring frequency for effluent and upstream temperature monitoring has been continued at 1/week to provide seasonal data to calculate a 90^{th} percentile value for the next reissuance. Upstream pH data shall continue to be collected 1/week.

Total Nitrogen, Total Phosphorus, Orthophosphate, Total Kjeldahl Nitrogen (TKN), Nitrate plus Nitrite -- The previous permit contains monitoring for total nitrogen, total phosphorus, orthophosphate, TKN, and nitrate plus nitrite. Since reissuance of this permit in June of 2005, the facility has been covered by the General Permit for Total Nitrogen and Total Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia (VAN040066). Therefore, nitrogen and phosphorus nutrient monitoring has been removed from this permit. A

Chesapeake Bay Nutrients Reopener Special Condition (Part I.C.17) has been included to allow the permit to be reopened if new nutrient standards are adopted.

Whole Effluent Toxicity (WET) -- The WETLIM10 program was run with the revised flow frequencies for the discharge point to verify that the existing toxicity limit is sufficiently stringent. The WETLIM10 program generated acute and chronic wasteload allocations which were input into the STATS program and a value to force a limit. The program output indicates that a chronic limit of 25.00 TU_c is needed.

For outfall 003, the facility has completed 14 valid chronic toxicity testing events for *Ceriodaphnia dubia* and *Pimephales promelas*. All of the data were significantly below the 25.00 TU_c limit. None of the data was above 5.0 TU_c. These data do not appear to have a reasonable potential to exceed the wasteload allocation. However, backsliding on an existing water quality limit is not allowed. So, the 25.00 TU_c limit for outfall 003 will be carried forward. Given the low effluent toxicity, the monitoring frequency has been reduced to annual. Since, some toxicity was found with both species, chronic toxicity testing shall continue with *Ceriodaphnia dubia* and *Pimephales promelas*. For a summary of toxicity test data and a discussion of testing requirements refer to **Attachment K**.

D. Outfall 301 (Sanitary Wastewater)

Flow -- The permitted design flow of 0.040 MGD for this facility is taken from the previous permit and the application for the reissuance. In accordance with the current VPDES Permit Manual, flow is to be estimated and reported once per day.

pH -- The pH limits of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limits are in accordance with federal technology-based guidelines, 40 CFR Part 133, for secondary treatment. Grab samples shall continue to be collected once per day.

Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS) -- BOD_5 and TSS are technology-based requirements for dischargers with secondary treatment required in accordance with 40 CFR Part 133. Effluent limits of 30 mg/L, 4500 g/d as a monthly average and 45 mg/L, 6800 g/d as a daily average for BOD_5 and TSS have been continued from the previous permit. Grab samples shall continue to be collected. The monitoring data for BOD_5 and TSS were significantly below the limitations so the monitoring frequency has been reduced from 1/month to 1/ 6 months. See **Attachment H** for a summary of discharge data and discussion of reduced monitoring.

Total Residual Chlorine (TRC) -- Part I.B includes monitoring requirements and limitations to ensure adequate disinfection.

E. Storm Water Outfall 555 (similar outfalls 005, 007, 009, 010, 013)

These outfalls are considered substantially identical so the monitoring requirements pertain to all five outfalls. Outfall 005 is not easily accessible for monitoring. Outfalls 007, 009, 010, and 013 will be monitored on a rotating basis. Of the parameters analyzed during the permit term and for the application, total suspended solids and Total Kjeldahl Nitrogen were above the screening criteria. These outfalls are subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector B Paper and Allied Products (Paperboard Mills Subcategory) (BOD_5)

BOD_5 -- Most of the BOD_5 data were above the quantification levels but none of the data points for BOD_5 collected during the permit term were higher than the screening criterion. In accordance with the VPDES Permit Manual recommendations for Sector B, annual storm water monitoring via grab samples for BOD_5 has been continued from the previous permit.

Total Suspended Solids (TSS) -- Three data points for TSS collected during the permit term were higher than the screening criterion. Therefore, annual TSS monitoring via grab samples has been continued from the previous permit.

Copper, Dissolved -- None of the data points for dissolved copper collected during the permit term were higher than the screening criterion. Therefore, dissolved copper monitoring has been discontinued.

Total Kjeldahl Nitrogen -- Three of the data points for Total Kjeldahl Nitrogen (TKN) were above the screening criterion. Therefore, annual TKN monitoring via grab samples has been added.

pH -- The pH limitations of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limitations can not be removed due to backsliding limitations. Monitoring will continue once per year via grab samples.

Flow -- In conjunction with the other annual monitoring parameters, flow will be estimated annually for the storm events sampled.

F. Storm Water Outfall 012

Of the parameters analyzed during the permit term and for the application, total suspended solids, total nitrogen, and Total Kjeldahl Nitrogen were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector B Paper and Allied Products (Paperboard Mills Subcategory) (BOD_5)

Flow -- In conjunction with the other annual monitoring parameters, flow will be estimated annually for the storm events sampled.

pH -- The pH limitations of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limitations can not be removed due to backsliding limitations. In accordance with the VPDES Permit Manual, annual pH monitoring frequency via grab samples shall be continued.

BOD_5 -- All the BOD_5 data were above the quantification levels but none of the data points for BOD_5 collected during the permit term were higher than the screening criterion. In accordance with the VPDES Permit Manual recommendations for Sector B, annual storm water monitoring via grab samples for BOD_5 has been continued from the previous permit.

Total Suspended Solids (TSS) -- Six data points for TSS collected during the permit term were higher than the screening criterion. Therefore, annual TSS monitoring via grab samples has been continued from the previous permit.

Nitrate plus Nitrite, Total Nitrogen, Total Kjeldahl Nitrogen (TKN) -- None of the data points for nitrate plus nitrite were higher than the screening criterion. Therefore, nitrate plus nitrite has been discontinued. Two of the data points for TKN were higher than the screening criterion. The one data point for total nitrogen that was higher than the screening criterion appeared to be due to the TKN value. So, total nitrogen monitoring has not been included in the permit. However, annual TKN monitoring via grab samples shall be required.

G. Storm Water Outfall 014

Of the parameters analyzed during the permit term and for the application, BOD_5, chemical oxygen demand, total suspended solids, dissolved copper, and Total Kjeldahl Nitrogen were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector B Paper and Allied Products (Paperboard Mills Subcategory) (BOD_5)

BOD_5 -- One data point for BOD_5 collected during the permit term was higher than the screening criterion. In accordance with the recommendations in the VPDES Manual for

Sector B storm water monitoring requirements, annual storm water monitoring via grab samples for BOD_5 has been continued from the previous permit.

pH -- The pH limitations of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limitations can not be removed due to backsliding limitations. Annual pH monitoring via grab samples has been continued from the previous permit term.

Chemical Oxygen Demand (COD) -- Two data points for COD collected during the permit term were higher than the screening criterion. These COD values were significantly higher than the screening criterion and the corresponding BOD_5 values for the sample event were not elevated. Since BOD_5 data were not elevated when the COD values failed the screening criterion and there may be compounds associated with the COD that are toxic to biological life, COD testing is needed. Therefore, annual COD testing via grab samples shall be required.

Total Suspended Solids (TSS) -- Four data points for TSS collected during the permit term were higher than the screening criterion. Therefore, annual TSS monitoring via grab samples has been continued from the previous permit term.

Copper, Total Recoverable; Flow -- Two data points for dissolved copper collected during the permit term was higher than the screening criterion. The copper benchmark value of 18 μg/L is more stringent than the storm water criteria of 28 μg/L. The benchmark value is given in total recoverable form. Quarterly copper monitoring via grab samples has been continued from the previous permit term. But, the samples shall be analyzed for copper in total recoverable form. Flow will be estimated quarterly for the storm events sampled.

Total Kjeldahl Nitrogen (TKN) -- Two of the data points for TKN were higher than the screening criterion. Therefore, annual TKN monitoring via grab samples has been added.

H. Storm Water Outfall 015

Of the parameters analyzed during the permit term and for the application, Total Kjeldahl Nitrogen was above the screening criterion. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector B	Paper and Allied Products (Paperboard Mills Subcategory) (BOD_5)

BOD_5 -- Some of the BOD_5 data were above the quantification levels but none of the data points for BOD_5 collected during the permit term were higher than the screening criterion.

In accordance with the VPDES Permit Manual recommendations for Sector B, annual storm water monitoring via grab samples for BOD_5 has been continued from the previous permit.

Total Kjeldahl Nitrogen (TKN) -- One of the data points was slightly higher than the screening criterion. During the same storm event, the composite sample was not above the screening criteria. So, monitoring will not be required for TKN.

Flow -- Flow will continue to be estimated annually for the storm events sampled.

I. Storm Water Outfall 017

Of the parameters analyzed during the permit term and for the application, chemical oxygen demand, total suspended solids, total nitrogen, and Total Kjeldahl Nitrogen were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector B Paper and Allied Products (Paperboard Mills Subcategory) (BOD_5)

Chemical Oxygen Demand (COD) -- One data point for COD collected during the permit term was higher than the screening criterion. The COD value was higher than the screening criteria but the corresponding BOD_5 value for the sample event was not elevated. Since BOD_5 data were not elevated when the COD values failed the screening criterion and there may be compounds associated with the COD that are toxic to biological life, COD testing is needed. Therefore, annual COD testing via grab samples shall be required.

BOD_5 -- Some of the BOD_5 data were above the quantification levels but none of the data points for BOD_5 collected during the permit term were higher than the screening criterion. In accordance with the VPDES Permit Manual recommendations for Sector B, annual storm water monitoring via grab samples for BOD_5 has been continued from the previous permit.

Total Suspended Solids (TSS) -- Five data points for TSS collected during the permit term were higher than the screening criterion. Therefore, annual TSS monitoring via grab samples has been continued from the previous permit term.

Copper, Dissolved -- None of the data points for dissolved copper collected during the permit term were higher than the screening criterion. Therefore, dissolved copper monitoring has been discontinued.

Total Nitrogen, Total Kjeldahl Nitrogen (TKN) -- Two of the data points for TKN were higher than the screening criterion. The one data point for total nitrogen that was higher than the screening criterion appeared to be due to the TKN value. So, total nitrogen monitoring has not been included in the permit. However, annual TKN monitoring via grab samples has been added.

Flow -- In conjunction with the other annual monitoring parameters, flow will be estimated annually for the storm events sampled.

J. Storm Water Outfall 018

Of the parameters analyzed during the permit term and for the application total suspended solids, total nitrogen, and Total Kjeldahl Nitrogen were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector B Paper and Allied Products (Paperboard Mills Subcategory) (BOD_5 not required)

BOD_5 -- The BOD_5 data were above the quantification levels but none of the data points for BOD_5 collected during the permit term were higher than the screening criterion. In accordance with the VPDES Permit Manual recommendations for Sector B, annual storm water monitoring via grab samples for BOD_5 has been continued from the previous permit.

Total Suspended Solids (TSS) -- Two data points collected during the permit term were higher than the screening criterion. Therefore, annual TSS monitoring via grab samples has been continued from the previous permit term.

pH -- The pH limitations of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limitations can not be removed due to backsliding limitations. Monitoring will continue once per year via grab samples.

Total Nitrogen, Total Kjeldahl Nitrogen (TKN) -- Two of the data points for TKN were higher than the screening criterion. The one data point for total nitrogen that was higher than the screening criterion appeared to be due to the TKN value. So, total nitrogen monitoring has not been included in the permit. However, annual TKN monitoring via grab samples has been added.

Flow -- In conjunction with the other annual monitoring parameters, flow will be estimated annually for the storm events sampled.

K. Storm Water Outfall 021

Of the parameters analyzed during the permit term and for the application BOD_5, dissolved zinc, total suspended solids, and Total Kjeldahl Nitrogen (TKN) were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector B Paper and Allied Products (Paperboard Mills Subcategory) (BOD_5)

BOD_5 -- One data point for BOD_5 collected during the permit term was higher than the screening criterion. In accordance with the recommendations of the VPDES Permit Manual for Sector B storm water monitoring requirements, BOD_5 has been included. Annual BOD_5 monitoring via grab samples has been continued from the previous permit term.

Total Suspended Solids (TSS) -- One data point for dissolved zinc collected during the permit term was higher than the screening criterion. Therefore, annual TSS monitoring via grab samples has been continued from the previous permit term.

Zinc, Total Recoverable; Flow -- Two data points for dissolved zinc were higher than the screening criterion. The zinc benchmark value of 120 µg/L is more stringent than the storm water criteria of 240 µg/L. The benchmark value is given in total recoverable form. Therefore, quarterly zinc monitoring via grab samples has been continued from the previous permit term. But, the samples shall be analyzed for zinc in total recoverable form. Flow will be estimated quarterly for the storm events sampled.

pH -- The pH limitations of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limitations can not be removed due to backsliding limitations. Monitoring will continue once per year via grab samples.

Total Kjeldahl Nitrogen (TKN) -- One of the data points for TKN was significantly higher than the screening criterion. Therefore, annual TKN monitoring via grab samples has been added.

L. Storm Water Outfalls 022

Of the parameters analyzed during the permit term and for the application total recoverable iron, nitrate plus nitrite, and Total Kjeldahl Nitrogen (TKN) were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector L Landfills, Land Application Site, and Open Dumps (All Land Application Site and Open Dumps Subcategory)
(TSS, Fe)

Total Suspended Solids (TSS) -- No data points for TSS collected during the permit term were higher than the screening criterion, but all the values were above the quantification level. In accordance with the recommendations of the VPDES Permit Manual for Sector L storm water monitoring requirements, annual storm water monitoring via grab samples has been continued from the previous permit.

Iron, Total Recoverable -- Four data points were higher than the screening criterion. Therefore, annual monitoring via grab samples has been continued from the previous permit term.

Nitrate plus Nitrite -- One of the data points for nitrate plus nitrite was significantly above the screening criterion. Therefore, annual monitoring for nitrate plus nitrite via grab samples has been continued from the previous permit term.

Total Kjeldahl Nitrogen (TKN) -- One of the data points for TKN was slightly higher than the screening criterion. Nitrite plus nitrite data was not elevated during this storm event. Since the composite sample for this storm event was not elevated and nitrate plus nitrite sampling is being required for this facility, monitoring has not been required for this parameter.

Flow -- In conjunction with the other annual monitoring parameters, flow will be estimated annually for the storm events sampled.

M. Storm Water Outfalls 023

Of the parameters analyzed during the permit term and for the application chemical oxygen demand, total suspended solids, total recoverable iron, total nitrogen, and Total Kjeldahl Nitrogen (TKN) were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector L Landfills, Land Application Site, and Open Dumps (All Land Application Site and Open Dumps Subcategory)
(TSS, Fe)

Total Suspended Solids (TSS) -- Three data points for TSS collected during the permit term were higher than the screening criterion. Therefore, annual monitoring for TSS via grab samples has been continued from the previous permit term.

COD -- Three data points collected during the permit term were higher than the screening criterion. Therefore, annual COD monitoring via grab samples has been continued from the previous permit.

Iron, Total Recoverable-- Four data points for iron collected during the permit term were higher than the screening criterion. In accordance with recommendations of the VPDES Permit Manual for Sector L storm water monitoring requirements, annual storm water monitoring via grab samples for total iron has been continued from the previous permit term.

Total Nitrogen, Nitrate plus Nitrite, Total Kjeldahl Nitrogen (TKN) -- None of the nitrate plus nitrite data exceeded the screening criterion. So, nitrate plus nitrite monitoring has been discontinued. One of the data points for TKN was significantly higher than the screening criterion. The two data points for total nitrogen above the screening criterion appeared to be primarily due to the TKN value. So, total nitrogen monitoring has not been included in the permit. However, annual TKN monitoring via grab samples has been added.

Flow -- In conjunction with the other annual monitoring parameters, flow will be estimated annually for the storm events sampled.

N. Storm Water Outfall 025

Of the parameters analyzed during the permit term and for the application, total recoverable iron, total suspended solids, and Total Kjeldahl Nitrogen were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector L Landfills, Land Application Site, and Open Dumps (All Land Application Site and Open Dumps Subcategory)
(TSS, Fe)

Total Suspended Solids (TSS) -- One of data points collected during the permit term for was higher than the screening criterion. In accordance with the recommendation of the VPDES Permit Manual for Sector L storm water monitoring requirements, annual monitoring via grab samples has been continued from the previous permit term.

Iron, Total Recoverable -- Four data points were higher than the screening criterion. In accordance with the Sector L storm water monitoring requirements, annual storm water monitoring via grab samples for TSS and total recoverable iron has been included. Annual monitoring via grab samples has been continued from the previous permit term.

Total Kjeldahl Nitrogen (TKN) -- Two of the data points for TKN were higher than the screening criterion. Therefore, annual TKN monitoring via grab samples has been added.

Flow -- Flow shall continue to be estimated annually for the storm events sampled.

O. Storm Water Outfall 026

Of the parameters analyzed during the permit term and for the application, total recoverable iron and Total Kjeldahl Nitrogen were above the screening criteria. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector L Landfills, Land Application Site, and Open Dumps (All Land Application Site and Open Dumps Subcategory)
(TSS, Fe)

The discharge from this facility is from the closed Bedford Landfill. The permittee has certified that they qualify as no exposure to industrial activity from this site.

Total Suspended Solids (TSS) -- None of the data for total suspended solids were above the screening criterion. Since this site is not exposed to industrial activity, TSS monitoring has been discontinued.

Iron, Total Recoverable -- Three data points were higher than the screening criterion. For outfall 028 were higher than the screening criterion. These data reflect the runoff through soils containing iron on the site and in this case are not reflective of industrial activity on the site. The landfill has a vegetative cover and iron monitoring will not be required for this outfall.

Total Kjeldahl Nitrogen (TKN) -- One of the data points was slightly higher than the screening criterion. However, the composite sample taken during the same storm event was not above the screening criterion. TKN monitoring will not be required for this outfall.

P. Storm Water Outfall 028

Of the parameters analyzed during the permit term and for the application, total recoverable iron and Total Kjeldahl Nitrogen were above the screening criterion. This outfall is subject to storm water monitoring requirements for the following storm water general permit industrial sector specific monitoring category:

Sector L Landfills, Land Application Site, and Open Dumps (All Land Application Site and Open Dumps Subcategory)
(TSS, Fe)

Total Suspended Solids (TSS) -- None of the data for total suspended solids were above the screening criterion. In accordance with recommendations of the VPDES Permit

Manual for Sector L storm water monitoring requirements, annual storm water monitoring via grab samples for has been continued from the previous permit.

Iron, Total Recoverable -- Four data points were higher than the screening criterion. In accordance with the recommendations of the VPDES Permit Manual for Sector L storm water monitoring requirements, annual storm water monitoring via grab samples for has been continued from the previous permit.

Total Kjeldahl Nitrogen (TKN) -- One of the data points was slightly higher than the screening criterion. However, the composite sample taken during the same storm event was not above the screening criterion. Therefore, annual TKN monitoring via grab samples has not been required for this outfall.

Flow -- Flow shall continue to be estimated annually for the storm events sampled.

Q. Outfall 999 (Calculated)

BOD_5 -- The total BOD_5 load discharged from the facility can not exceed that allocated to the facility in the Water Quality Management Plan. The 2105 kg/day monthly average and 4210 kg/day maximum daily limits have been continued from the previous permit. BOD_5 load for intake water may be subtracted from the BOD_5 contribution from outfalls 001, 002, and outfall 003. This calculation shall continue to be reported monthly.

Color Rise -- Color was limited in the 1989 permit to cause a maximum increase of 70 PCU in the James River. This limit of 70 PCU rise above background color has been carried forward from the previous permit. This calculation shall continue to be reported monthly.

Since the color rise should account for all discharges, it is included as a summation of outfalls 001, 002, and 003 designated as outfall 999. The PCU units for the effluent shall be calculated as a mass balance of the effluent flow (Qe) and color units (PCU) for outfalls 001, 002, and 003.

$$\text{Color } (PCU)_{effluent} = \frac{PCU_{001}(Qe_{001}) + PCU_{002}(Qe_{002}) + PCU_{003}(Qe_{003})}{Q_{stream}}$$

There is no federal effluent guideline limitation or water quality standard for color from paper mills. The Virginia Water Quality Standard for color is part of the narrative general criteria found under 9 VAC 25-26-20 A. The text of the standard is as follows:
"All state waters ... shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which

are inimical or harmful to human, animal, plant, or aquatic life. Specific substances to be controlled include, but are not limited to: ... substances that produce color..."

In accordance with 40 CFR 143, the secondary Maximum Contaminant Level (MCL) for water from public water systems is 15 Platinum Cobalt Units (PCU). The City of Lynchburg has an intake on the James River 9.5 miles downstream from the mill. The 1989 Fact Sheet determined that an instream mix concentration of 724 PCU would allow the MCL to be met instream at 7Q10 conditions. To calculate the color rise limit, the average of background values above this facility result in 33 PCU or a rise up to 103 PCU. Using this target, a limit of 1825 PCU would be permitted when the maximum flow at outfall 003 is 10.9 MGD and the 7Q10 is 283.9 MGD. Color rise data collected during the permit term were significantly below the permit limit. Given that the total discharge of process water from outfalls 001, 002, and 003 and the 7Q10 flow frequency have decreased from the previous permit term, it is anticipated that the permittee should have no difficulty complying with the color rise limit.

Heat Rejected --The permit application lists the maximum daily average summer temperature above the water quality criterion of 32 °C. Monitoring data shows that the temperature of the effluent maximum daily was 10.2 °C higher than the maximum intake water during the corresponding months of June through September during the permit term. In 1992, the company performed a thermal mixing zone study to define the volume of the river which exceeded the temperature criteria and the standard of 3 °C increase. In accordance with Section 316(a) of the Clean Water Act and 9 VAC 25-260-20 B5, a thermal mixing zone was established in the previous permit to allow increased temperature as long as thermal load limits were met. The BTU limit was set at 110 percent of the maximum calculated during the study period of January 1992 through August 1994. This limit is a best professional judgment limit. The total heat rejected limit is reported as outfall 999. This calculation shall continue to be reported monthly.

See **Attachment F** for a summary of the temperature data collected. The maximum boundaries of the thermal mixing zone for outfall 002 are 16 feet from the shore, 460 feet downstream, and 20 feet upstream. The heat is expected to dissipate rapidly from outfall 003, so outfall 003 is not included in the heat limit for the facility. The heat rejected limit of 67.2 million BTU/hr has been continued from the previous permit. BTUs should be calculated from effluent flow (Qe), effluent temperature (Te), and river intake temperature (Tr) as follows:

$$\frac{\text{BTU}}{\text{hr}} = \text{Qe}\ \frac{\text{gal}}{\text{day}} \times \frac{1\ \text{gram}}{\text{cm}^3} \times \frac{28317\ \text{cm}^3}{7.4805\ \text{gal}} \times \frac{1\ \text{BTU}}{252\ \text{calorie}} \times \frac{1\ \text{day}}{24\ \text{hr}} \times (\text{Te} - \text{Tr})^{\circ}\text{C}$$

$$\frac{\text{BTU}}{\text{hr}} = 0.6259\ \text{Qe}(\text{Te}-\text{Tr})$$

17. **Antibacksliding Statement:** The total suspended solids loading limits for outfall 003 were increased because the monthly average production and daily average production from paper

machine No. 4 were added. Since these limits are based upon the federal effluent guideline requirements, backsliding is allowed pursuant to 40 CFR Section 122.62.

The total residual chlorine limits for outfall 001 and 002 have been removed because chlorine is no longer added to the water used for cooling and discharged from these outfalls. In accordance with 9 VAC 31-220 L.2.a, backsliding on a limit is allowed when material and substantial alterations or additions to the permitted facility occurred after the permit issuance which justify the application of a less stringent limitation.

There are no other limitations less stringent than the previous permit, and the permit limits comply with the antibacksliding requirements of 9 VAC 25-31-220 L of the VPDES Permit Regulation.

18. <u>**Compliance Schedule:**</u> There are no compliance schedules included in the permit.

19. <u>**Special Conditions:**</u> A brief rationale for each special condition contained in the permit is given below.

A. **Total Residual Chlorine (TRC) Limitations and Monitoring Requirements (Outfall 301) (Part I.B)**

<u>Rationale:</u> This condition requires that the permittee monitor the TRC concentration after chlorine contact. In accordance with 40 CFR 122.4 (e) and Water Quality Standards 9 VAC 25-260-170, Bacteria; Recreational Waters, permittees are required, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. These requirements ensure proper operation of chlorination equipment to maintain adequate disinfection. Due to the proximity of a public water supply intake downstream, the Virginia Department of Health requested that the minimum TRC after contact be 1.5 mg/L. Data from monthly reports shows that there is significant infiltration into the conveyance system within the Big Island community. For this reason, one extra TRC grab sample must be collected when the influent flow is above 0.040 MGD.

B. **Compliance Reporting under Part I.A and Part I.B (Part I.C.1)**

<u>Rationale:</u> In accordance with VPDES Permit Regulation, 9 VAC 25-31-190 J4 and 220 I, DEQ is authorized to establish monitoring methods and procedures to compile and analyze data on water quality, as per 40 CFR Part 130, Water Quality Planning and Management, Subpart 130.4. This condition is necessary when toxic pollutants are monitored by the permittee and a maximum level of quantification and/or specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. This condition also establishes protocols for calculation of reported values.

C. **95% Capacity Reopener (I.C.2)**

Rationale: This condition requires that the permittee address problems resulting from high influent flows, in a timely fashion, to avoid non-compliance and water quality problems from plant overloading. This requirement, for all POTW and PVOTW permits, is contained in 9 VAC 25-31-200 B4 of the VPDES Permit Regulations.

D. **CTC, CTO Requirement (Part I.C.3)**

Rationale: This condition is required by Code of Virginia § 62.1-44.19 and Sewage Collection and Treatment Regulations, 9 VAC 25-790.

E. **Operation and Maintenance Manual Requirement for Sewage Treatment Plant (Part I.C.4)**

Rationale: Submittal of the Manual to DEQ for approval is required by the Code of Virginia Section § 62.1-44.19; the Sewage Control and Treatment Regulations, 9 VAC 25-790; and the VPDES Permit Regulation, 9 VAC 25-31-190 E, to provide an opportunity for review of current and proposed operations of the facility. Within 90 days from the effective date of the permit, the permittee is required to either submit an updated Manual or notify DEQ that the Manual remains accurate.

F. **Licensed Operator Requirement (Part I.C.5)**

Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 C and the Code of Virginia § 54.1-2300 et seq., Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.), require licensure of operators. Due to the size and complexity of the wastewater treatment plants, a Class I operator is required for the industrial wastewater treatment plant and a Class IV operator for the 0.040 MGD sanitary sewage treatment plant.

G. **Reliability Class (Part I.C.6)**

Rationale: A Reliability Class II has been assigned to the sanitary sewage treatment plant at the facility. Reliability class designations are required by Sewerage Collection and Treatment Regulations, 9 VAC 25-790 for all municipal facilities.

H. **Sewage Sludge Reopener (Part I.C.7)**

Rationale: This condition is required by VPDES Permit Regulation, 9 VAC 25-31-220 C4 for all permits issued to treatment works treating domestic sewage. This condition provides that the permit may be modified to include a more stringent sewage sludge standard.

I. **Sewage Sludge Use and Disposal (Part I.C.8)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B2; and 420 and 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal. Technical requirements may be derived from the VPA Permit Regulation, 9 VAC 25-32-10 et seq. This special condition, in accordance with Guidance Memorandum No. 97-004, clarifies that the Sludge Management Plan approved with the reissuance of this permit is an enforceable condition of the permit.

J. **Notification Levels (Part I.C.9)**

Rationale: This condition is required by VPDES Permit Regulation, 9 VAC 25-31-200 A for all manufacturing, commercial, mining, and silvicultural dischargers. This special condition requires that a permittee notify the DEQ of any changes in effluent quality or the presence of certain pollutants in the effluent.

K. **Industrial Operations and Maintenance Manual Requirement (Part I.C.10)**

Rationale: The Code of Virginia Section 62.1-44.16, VPDES Permit Regulation, 9 VAC 25-31-190 E, and 40 CFR 122.41(e) require proper operation and maintenance of the permitted facility. Section 40 of the Clean Water Act requires the permittee to provide an opportunity for the State to review the operations of the treatment facility. Compliance with an approved manual ensures these requirements are met. Within 90 days from the effective date of the permit, the permittee is required to either submit an updated Manual or notify DEQ that the Manual remains accurate.

L. **Materials Handling/Storage (Part I.C.11)**

Rationale: 9 VAC 25-31-50 A prohibits the discharge of any wastes into State waters unless authorized by permit. The Code of Virginia § 62.1-44.16 and § 62.1-44.17 authorizes the Board to regulate the discharge of industrial waste or other waste.

M. **Chlorophenolic Containing Biocides Prohibition (Part I.C.12)**

Rationale: Federal regulations at 40 CFR 430.24(d) require certification by facilities that they are not using certain biocides. GP Big Island has certified that chlorophenolic biocides are not used at the Big Island facility. This special condition states that the permittee is not authorized to use these types of biocides. For this reason, limitations on pentachlorophenol or trichlorophenol are not required. A permit modification request must be submitted to authorize the use of such biocides so that effluent limitations for chlorophenolic compounds required by federal regulation (40 CFR 430) may be added to the permit.

N. **Cooling Water and Boiler Additives (Part I.C.13)**

Cooling water treatment chemicals or additives may not be added without first notifying the DEQ Regional Office.

Rationale: Chemical additives may be toxic or otherwise violate the receiving stream water quality standards. Upon notification, the Regional Office can determine if this activity will warrant a modification to the permit.

O. **Net Limitations for BOD_5 (Part I.C.14)**

Rationale: Net limits may be used to calculate the BOD_5 contribution from cooling water discharged to outfalls 001, 002, and 003, since intake water used is from the James River.

P. **Color Monitoring (Part I.C.15)**

Rationale: The Virginia Water Quality Standard for color is part of the narrative general criteria found under 9 VAC 25-26-20A. The text of the standard indicates that "all state waters... shall be free of substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which.... interfere directly or indirectly with designated uses of such water... Specific substances to be controlled include, but are not limited to:... substances that produce color..." This condition specifies monitoring locations and calculations to determine color rise.

Q. **Effluent Monitoring Frequencies (Part I.C.16)**

Rationale: Permittees are granted a reduction in monitoring frequency based on a history of permit compliance. To remain eligible for the reduction, the permittee should not have violations related to the effluent limits for which reduced frequencies were granted. If the permittee fails to maintain the previous level of performance, the baseline monitoring frequency should be reinstated for those parameters that were previously granted a monitoring frequency reduction. These reductions are in conformance with the VPDES Permit Manual and EPA's proposed "Interim Guidance for Performance-Based Reduction of NPDES Permit Monitoring Frequencies" (EPA 833-B-96-001) published in April 1996.

R. **Chesapeake Bay Nutrients Reopener (Part I.C.17)**

Rationale: Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life used support goal, and the 2008 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report indicates that 83% of the mainstem Bay does not fully support his use support goal under Virginia's water quality assessment guidelines. Nutrient enrichment is cited as one of the primary causes for impairment.

S. **Total Maximum Daily Load (TMDL) Reopener (Part I.C.18)**

Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

T. **Ground Water Monitoring Plan (Part I.C.19)**

Rationale: None of the wastewater treatment ponds are lined. Risk of ground water contamination at this facility was rated among the highest in the Blue Ridge region of 92 impoundments in 1993. Hazardous pollutants are used in manufacturing and may be present in wastewater and sludge.

State Water Control Law § 62.1-44.21authorizes the Board to request information needed to determine the discharge's impact on State waters. Ground water monitoring of parameters of concern will indicate whether possible lagoon seepage is resulting in violations to the State Water Control Board's Ground Water Standards. A statistical evaluation report shall be submitted to DEQ followed by a Corrective Action Plan if contamination is identified.

U. **PCB Monitoring Study (Part I.C.20)**

Rationale: This special condition has been added in accordance with Guidance Memo 09-2001, which directs PCB monitoring for Total Daily Maximum Load (TMDL) development. A PCB TMDL for the James River is scheduled for completion in 2016.

V. **Whole Effluent Toxicity Testing Limitation and Monitoring Requirements (Part I.D)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. In accordance with 9 VAC 25-31-220 D, a whole effluent toxicity limitation has been continued from the previous permit because the effluent demonstrated a reasonable potential to cause instream toxicity. See **Attachment K** for the WET limit determination calculations.

W. **Storm Water Management Evaluation (Part I.E.1)**

Rationale: The Clean Water Act 402(p)(2)(B) requires permits for storm water discharges associated with industrial activity. VPDES permits for storm water discharges must establish Best Available Technology/ Best Conventional Pollutant Control Technology (BAT/BCT) requirements in accordance with 402(p)(3) of the Act. The Storm Water Pollution Prevention Plan (SWPPP) is the vehicle proposed by EPA in the final NPDES General Permits for Storm Water Discharges with Industrial Activity (Federal Register September 9, 1992) to meet the requirements of the Act. Additionally, the VPDES Permit Regulation, 9 VAC 25-31-220K, and 40 CFR 122.44(k) allows best management practices (BMPs) for the control of toxic pollutants listed in Section 307(a)(1), and hazardous substances listed in Section 311, of the Clean Water Act, where numeric limits are infeasible or BMPs are needed to accomplish the purpose/intent of the law.

This special condition requires that the SWPPP be developed and maintained in accordance with Part I.E.2 of the permit. The effectiveness of the Plan will be evaluated for storm water outfalls for those parameters listed in Part I.A of this permit. As discussed in Section 16 of this Fact Sheet, screening criteria will be used as a tool when evaluating the data and effectiveness of the SWPPP. The permittee shall use this information to guide in the review of the SWPPP and implement appropriate changes as necessary. An annual report is required and shall include a summary of data collected the previous year and the status of the SWPPP to maintain pollutant concentrations below the screening criteria. The facility is required to implement additional best management practices as necessary to reduce copper and zinc concentrations attributed to the facility to below levels of concern. In summary, the pollutants of concern and corresponding screening criteria are as follows:

Pollutant of Concern	**Screening Criteria**
BOD_5	30 mg/L
COD	120 mg/L
TSS	100 mg/L
Nitrate plus Nitrite	1.76 mg/L
Copper, Total Recoverable	18 µg/L
Zinc, Total Recoverable	120 µg/L
Iron, Total Recoverable	1.0 mg/L

X. **General Storm Water Special Conditions (Part I.E.2)**

Rationale: This requirement is based upon the VPDES Permit Regulation, 9 VAC 25-31-120B, which requires that quantitative data be provided for storm water discharges associated with industrial activity. Visual quarterly inspections are required for outfalls associated with industrial activity. These requirements are taken from the VPDES general permit for discharges of storm water associated with industrial activity, 9 VAC

25-151-10 et seq. A provision has been added so that the permittee can obtain approval from DEQ to discontinue quarterly visual inspections for any storm water outfall that does not have a potential for exposure to industrial activity at the site.

The permittee submitted documentation that outfalls 005, 007, 009, 010, and 013 are substantially identical outfalls. The drainage areas for these outfalls are associated with industrial activity from loading and unloading areas, parking lot areas, and the entrance road. Outfall 005 is not easily accessible for monitoring. Quarterly visual and analytical monitoring requirements for these outfalls will be met by monitoring outfalls 007, 009, 010, and 013 on a rotating basis.

Y. **Storm Water Pollution Prevention Plan (Part I.E.3)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-10 defines discharges of storm water from industrial activity in 9 industrial categories. 9 VAC 25-31-120 requires a permit for these discharges. The Storm Water Pollution Prevention Plan (SWPPP) requirements of the permit are derived from the VPDES General Permit for Discharges of Storm Water Associated with Industrial Activity, 9 VAC 25-151-10 et seq. VPDES Permit Regulation, 9 VAC 25-31-220K, requires use of best management practices where applicable to control or abate the discharge of pollutants when numeric effluent limits are infeasible or the practices are necessary to achieve effluent limits or to carry out the purpose and intent of the Clean Water Act and State Water Control Law.

The requirement for a Best Management Practices (BMP) Plan has been met in this special condition. VPDES Permit regulation, 9 VAC 25-31-100, requires that new applications include a BMP Plan, for ancillary industrial activities under Section 304(3) of the Clean Water Act. According to 9 VAC 25-31-220 K, BMPs are allowed where numeric limits are infeasible or where BMPs are needed to accomplish the purpose of the law. The revised Best Management Practices (BMP) Plan was approved on February 9, 2005. This BMP Plan is part of the SWPPP.

Z. **Sector Specific Storm Water Pollution Prevention Plan Requirements -- Landfills, Land Application Sites, and Open Dumps (Sector L) (Part I.E.4)**

Rationale: In accordance with the VPDES Storm Water General Permit Regulation (9 VAC 25-151-10 et. seq.) Sector L specific requirements for landfills have been included.

AA. **Sector Specific Storm Water Pollution Prevention Plan Requirements -- Steam Electric Generating Facilities (Sector O) (Part I.E.5)**

Rationale: In accordance with the VPDES Storm Water General Permit Regulation (9 VAC 25-151-10 et. seq.), Sector O specific requirements for steam electric generating facilities have been included.

AB. **Sector Specific Storm Water Pollution Prevention Plan Requirements -- Land Transportation and Warehousing (Sector P) (Part I.E.6)**

Rationale: In accordance with the VPDES Storm Water General Permit Regulation (9 VAC 25-151-10 et. seq.), Sector P specific requirements for transportation and warehousing facilities have been included. These sector requirements are referenced in the steam electric generating sector requirements of this permit, so they are included.

AC. **Conditions Applicable to All VPDES Permits (Part II)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

20. **NPDES Permit Rating Worksheet:** Total Score: 90
In accordance with Guidance Memo 92-004 and the VPDES Permit Manual, the NPDES Permit Rating Worksheet has been completed, and this facility has been classified as an industrial major. The completed worksheet is found in **Attachment L.**

21. **Changes to Permit:**

A. **Permit Limits and Monitoring Requirements:** See Table III on pages 74-79 for details on changes to the effluent limitations and monitoring requirements.

B. **Special conditions deleted from the permit are listed below:**

1. The Schedule of Compliance (old Part I.C) has been deleted because the schedule of achieving compliance with the whole effluent toxicity limit for outfall 003 has been completed.

2. The Chemical Mixing Zone Study (old Part I.D.13) has been deleted because the study required by this special condition has been completed.

3. The Bypass Point Special Condition (old Part I.D.16) has been deleted because there is no need to list in the permit a potential point where a bypass may occur or to include any further special language addressing bypasses at the facility. Bypasses must be reported in accordance with Part II.U. If the permit limits are met there is no requirement to report a bypass.

4. The Nutrient Reporting Calculations Special Condition (old Part I.D.20) has been deleted because the facility has been issued a general permit (VAN040066) with the nutrient limitations and these calculations are no longer part of the individual VPDES permit.

5. The Nutrient Removal Reports Special Condition (old Part I.D.21) has been deleted because the Basis of Design Report and Interim Optimization Plan Report for nutrient removal have been completed and submitted in accordance with the special condition. These reports were accepted on September 14, 2006. GP Big Island's implementation of the plan included dredging of the polishing pond and optimization of the nitrogen and phosphorus feed mechanism for the industrial wastewater treatment system. For 2009, GP Big Island was below the nitrogen and phosphorus wasteload allocations in their general nutrient watershed permit.

6. The General Permit Clause Special Condition (old Part I.D.24) has been deleted because the permittee has coverage under a nutrient watershed general permit (VAN040066).

C. **Special conditions that have been modified from the previous permit are listed below: (The referenced permit sections are for the new permit.)**

1. The Compliance Reporting under Part I.A and Part I.B Special Condition (Part I.C.1) has been modified in accordance with the VPDES Permit Manual to address changes in the reporting procedures.

2. The Operations and Maintenance Manual Requirement for Sewage Treatment Plant Special Condition (Part I.C.4) has been modified to reflect current VPDES Permit Manual recommendations.

3. The Reliability Class Special Condition (Part I.C.6) has been revised in accordance with the Sewerage Collection and Treatment Regulations.

4. The Industrial Operations and Maintenance Manual Special Condition (Part I.C.10) has been revised in accordance with the VPDES Permit Manual to include the sludge/solids disposal plan.

5. The Ground Water Monitoring Plan Special Condition (Part I.C.19) monitoring parameters and frequency have been modified. A statistical evaluation has also been required.

6. The Whole Effluent Toxicity (WET) Limitation and Monitoring Requirements -- Outfall 003 (Part I.D) has been revised to reflect a reduced monitoring frequency.

7. The Storm Water Management Evaluation Special Condition (Part I.E.1) has been modified to include a revised list of outfalls with pollutants of concern.

8. The General Storm Water Special Conditions (Part I.E.2) have been revised to reflect changes in the VPDES Permit Manual. These changes have been made to be consistent with requirements of the storm water general permit.

9. The Storm Water Pollution Prevention Plan (Part I.E.3) has been revised to reflect changes in the VPDES Permit Manual. These changes have been made to be consistent with requirements of the storm water general permit. A provision has been added so that the permittee can obtain approval from DEQ to discontinue quarterly visual inspections for any storm water outfall that does not have a potential for exposure to industrial activity at the site.

10. The Sector-Specific Storm Water Pollution Prevention Plan Requirements -- Landfills, Land Application Sites, and Open Dumps Special Condition (Sector L) (Part I.E.4) has been revised to reflect changes in the VPDES Permit Manual. These changes have been made to be consistent with requirements of the storm water general permit.

11. The Sector-Specific Storm Water Pollution Prevention Plan Requirements -- Steam Electric Generating Facilities Special Condition (Sector O) (Part I.E.5) has been revised to reflect changes in the VPDES Permit Manual. These changes have been made to be consistent with requirements of the storm water general permit.

12. The Sector-Specific Storm Water Pollution Prevention Plan Requirements -- Land Transportation and Warehousing Special Condition (Sector P) (Part I.E.6) has been revised to reflect changes in the VPDES Permit Manual. These changes have been made to be consistent with requirements of the storm water general permit.

13. In accordance with the VPDES Permit Manual, boiler permit pages (Part II) have been revised to reflect changes in the VPDES permit regulations regarding signatory requirements.

D. **New special conditions added to the permit are listed below:**

1. The Effluent Monitoring Frequencies Special Condition (Part I.C.16) has been to require that the permittee's reduced monitoring frequencies revert back to the previous frequencies if they are issued a Notice of Violation for any of the parameters with reduced monitoring.

2. A Total Maximum Daily Load (TMDL) Reopener Special Condition (Part I.C.18) has been added in accordance with the VPDES Permit Manual.

3. A PCB Monitoring Study Special Condition (Part I.C.20) has been added to require low level PCB congener monitoring for the James River Total Daily Maximum Load Study.

22. **<u>Variances/Alternate Limits or Conditions:</u>** The permittee requested a VPDES application testing waiver for total metals, using dissolved metals grab analysis per the current permit, in lieu of composited total metals. This waiver was granted because the water quality metals criteria are written in dissolved form rather than total recoverable form. A thermal mixing zone has been designated in the James River below outfall 003.

23. **<u>Public Notice Information required by 9 VAC 25-31-280 B:</u>**

All pertinent information is on file and may be inspected or copied by contacting Becky L. France at:

Virginia DEQ
Blue Ridge Regional Office
3019 Peters Creek Road
Roanoke, VA 24019
540-562-6700
becky.france@deq.virginia.gov

Persons may comment in writing or by e-mail to the DEQ on the proposed permit action and may request a public hearing during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for the comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state (1) the reason why a hearing is requested; (2) a brief informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and (3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may review the draft permit and application at the Blue Ridge Regional Office in Roanoke by appointment. A copy of the public notice is found in **Attachment M**.

24. **<u>303(d) Listed Segments (TMDL):</u>** Outfall 003 at this facility discharges directly to the James River. The stream segment receiving the effluent is listed on Part I.A of the approved 2008 303(d) list for non-attainment of fish tissue PCBs. The Virginia Department of Health has issued a Fish Consumption Advisory for an unknown source. A TMDL has not been prepared or approved for this stream segment; and it is anticipated that the TMDL will be completed by 2016. The permit contains a TMDL reopener clause which will allow the permit to be modified, in compliance with Section 303(d)(4) of the Act once a TMDL is approved. The permit also contains a PCB monitoring special condition (Part I.C.20) to require PCB monitoring for use in the TMDL development.

Storm water outfall 018 discharges into Reed Creek, and storm water outfall 026 discharges into an unnamed tributary to Reed Creek. The stream segment receiving the storm water is listed on Part I.A of the approved 303(d) list for non-attainment of bacterial standards. EPA approved the bacteria TMDL on June 21, 2004 for this segment. It does not contain a wasteload allocation (WLA) for this discharge. Since the discharges to Reed Creek consist of storm water, it is not believed that bacteria limitations are needed. The permit contains a TMDL reopener clause (Part I.C.18) which will allow it to be modified, in compliance with Section 303(d)(4) of the Act, if a TMDL WLA is approved or modified.

25. **Additional Comments:**

A. **Reduced Effluent Monitoring:** In accordance with Guidance Memorandum 98-2005, all permit applications received after May 4, 1998, are considered for reduction in effluent monitoring frequency. Only facilities having exemplary operations that consistently meet permit requirements may qualify for reduced monitoring. To qualify for consideration of reduced monitoring requirements, the facility should not have been issued any Warning Letters, Notices of Unsatisfactory Laboratory Compliance, Letter of Noncompliance (LON) or Notices of Violation (NOV), or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years.

This facility received the following Warning Letters within the past three years:

Warning Letter No. W2006-05-1003	The March 2006 DMR shows total contact chlorine minimum concentration reported as parameter 005 for outfall 301 instead of parameter #157. This administrative CEDS code reporting error does not affect the quality of the data.
Warning Letter No. W2006-10-W-1007	(April - August 2006) The permittee created DMR for GP did not show the limit for BOD_5 (parameter 003) at outfall 003. The loading data for this parameter was reported and so this minor omission does not affect the quality of the data.

These two warning letters refer to template information of the DMR form and do not in any way reflect upon the quality of the operation of the treatment facility or the quality of the data analysis procedures. Based upon a review of the files, it is believed that this facility has an exemplary operation and shall therefore qualify for a reduced monitoring evaluation of the data submitted on the DMRs. An evaluation of the DMR data is included in **Attachment H**.

B. **Previous Board Action:** A special consent order was issued to the permittee on August 10, 1992 to remove sanitary wastewater from their industrial wastewater treatment system, submit an approvable sludge management plan (SMP), set effluent limitations for a new sanitary package plant, eliminate contaminated storm water from outfall 008, and provide a schedule for the completion of thermal mixing zone studies. The order was cancelled on March 28, 1995.

A letter of agreement dated December 8, 1995, gave GP Big Island extra time to submit a completed Form 2F application. The application was received December 2, 1996. On October 15, 1997, a special consent order was issued to GP to provide a schedule for elimination of outfall 028 which discharged leachate from the closed industrial landfill. This consent order was completed and the permit modified on November 30, 1998 to remove this outfall.

C. **Staff Comments:** The discharge is not controversial. The discharge is in conformance with the existing planning document for the area. The permit is being reissued for a period of less than five years to even out the DEQ regional staff permit writing workload.

There are no industrial users not owned by the treatment works contributing to the sewage treatment works. Therefore, this facility is not subject to the requirements for adequate control for industrial users given under VPDES Permit Regulation, 9 VAC 25-31-280 B9.

The permittee submitted a no-exposure form to exempt them from storm water monitoring for outfall 026. This discharge drains from a sediment basin at the closed Bedford landfill. A spring which was classified as leachate from this landfill is trucked to the sludge ponds and subsequently pumped to the aeration basin or pumped to the main lift station for treatment in wastewater treatment system. Previously the facility collected discharge from the spring and pumped it to a holding pond. A tanker truck periodically drained and hauled the water from the holding pond to the wastewater treatment facility. No water quality criteria exceedances have occurred in the past eight sample events. The final cover has been maintained during the postclosure care period, including reseeding, slope stabilization, and regular site inspections. Since the spring water is not contaminated it will be rerouted to the holding pond and discharged into the stream at outfall 026. So, the permittee has been granted an exemption from storm water monitoring for this outfall.

On May 27, 2010, the explanation regarding the Water Quality Management Plan as a basis for the BOD_5 in Section #16 of the Fact Sheet was reworded to be more clear. Also, Section 24 of the Fact Sheet was revised to note that the Bacteria TMDL for Reed Creek was approved by EPA. These revisions did not affect any of the limits or special conditions in the permit.

On July 28, 2010, the equation to calculate color rise was revised to more accurately describe the color rise calculations for outfall 999 on page 41. This revision does not result in any changes in the permit.

D. **Public Comments:**

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has indicated that the freshwater mussel, the Yellow lance has been documented as a species of concern within the discharge area. DCR recommended that UV/ozone replace chlorination disinfection for this segment of stream. Outfall 301 discharges disinfected domestic wastewater into the industrial treatment. Given the low volume of wastewater from outfall 301 and the holding time in the industrial treatment system, it is not believed that chlorine disinfection will contribute to violations in the receiving stream at outfall 003.

According to the Virginia Department of Games and Inland Fisheries (VDGIF), the state Threatened green floater is known from this area. DGIF recommends monthly average and daily average ammonia concentration limits of 1.0 mg/L. They also recommend that effluent be treated with ultraviolet light disinfection rather than chlorine or continue dechlorination prior to discharge. The need for an ammonia limit for outfall 003 has been evaluated and the STATS statistical program output does not indicate that there is a potential to contribute to water quality violations of ammonia in the receiving stream. So, an ammonia limit has not been included in the permit. On June 15, 2010, DGIF further recommended the inclusion of EPA's proposed ammonia limits for waters where mussels may be present. EPA's proposed ammonia criteria are currently under review. When EPA's recommendations are finalized, DEQ will be in a position to initiate any needed changes in Virginia's ammonia criteria. It is the position of the Agency to base permitting actions upon Virginia's current ammonia criteria and not proposed EPA criteria that may be subject to change before they are finalized. See **Attachment D** for a summary of DCR and DVGIF comments. There were no other comments during the public comment period.

E. **Tables:**

Table I	Discharge Description (Pages 3-5)
Table II	Basis for Effluent Limitations (Pages 58-73)
Table III	Permit Processing Change Sheet (Pages 74-79)

F. **Attachments:**

A. Flow Frequency Memorandum
B. Maps and Diagrams
- Water Flow Diagram
- Wastewater/ Sludge Flow Diagram
- Outfall Location Maps
- Topographic Map

C. Facility Information
- Site Inspection Report

- Chemical Storage Information
- Material Storage Information for PCB Monitoring

D. Ambient Water Quality Evaluations
- 2008 Impaired Waters Summary (Excerpt)
- 2004 Use Attainment Summary (Excerpt)
- Upper James River Water Quality Management Plan (Excerpt)
- VDH Memorandums Regarding *Klebsiella Pneumoniae*
- Endangered Species Information

E. Ambient Water Quality Data
- Raw Water pH and Temperature Data
- Upstream STORET Data (Station 2-JMS282.28)
- Downstream STORET Data (Station 2-JMS275.75)
- Ammonia Expected Instream Concentration Prior to 1996 Expansion

F. Ground Water
- Ground Water Data Evaluation Memorandum
- Ground Water Monitoring Program Plan (Excerpt)

G. Outfall Data
- Storm Water Data

<u>Outfall 001</u>
- Effluent pH, Temperature, and Hardness Data

<u>Outfall 002</u>
- Effluent pH, Temperature, and Hardness Data

<u>Outfall 003</u>
- Effluent pH, Temperature, and Hardness Data
- *E. coli* Data
- Water Quality Standards Monitoring Data

H. Reduced Monitoring Frequency Memorandum

I. Mixing Zones
- Mixing Zone Calculations (MIXER 2.1) (Outfall 001)
- Mixing Zone Calculations (MIXER 2.1) (Outfall 002)
- Diffuser Calculations (Outfall 003)
- Thermal Mixing Zone Study (Excerpt)
- Mixing Zone Diffuser Study Plan and Conditional Approval Letter
- Mixing Zone Diffuser Study Approval Letter

J. Wasteload and Limit Calculations
- Storm Water Criteria Spreadsheet
- Summary of Effluent and Stream Data for Wasteload Allocations

<u>Outfall 001</u>
  - Antidegradation Wasteload Allocation Spreadsheet

<u>Outfall 002</u>
  - Antidegradation Wasteload Allocation Spreadsheet

Outfall 003

- Antidegradation Wasteload Allocation Spreadsheet
- STATS Program Output (ammonia)
- Federal Effluent Guidelines Excerpt (40 CFR Part 430 – Subparts F & J)

K. Toxicity Testing Data Evaluation

- Toxicity Testing Limit Justification Memorandum

Outfall 003

- Acute/ Chronic Toxicity Endpoint Spreadsheet (WETLIM10)
- STATS Program Output

L. NPDES Permit Rating Worksheet

M. Public Notice

N. EPA Checksheet

Table II-1
BASIS FOR EFFLUENT LIMITATIONS

( ) Interim Limitations
(x) Final Limitations

OUTFALL: 001
SIC CODE: 2631

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	1/Week	Measured
pH (Standard Units)	1	NA	NA	6.0	9.0	1Week	Grab
BOD_5 (mg/L)	2	NL	NA	NA	NL	1/Week	24 HC
Heat Rejected (BTU/hr)	4	NA	NA	NA	NL	1/Month	Calculated
Temperature	4	NA	NA	NA	NL °C	2D/Week	IS
Color (PCU)	5	NA	NA	NA	NL	1/Week	24 HC
BOD_5, intake (mg/L)	2	- NL	NA	NA	NL	1/Week	24 HC

NA = Not Applicable;
24 HC = 24 hour composite
2D/Week = 2 days per week

NL = No Limitations; monitoring only
IS = Immersion Stabilization

PCU = Platinum Cobalt Units

The basis for the limitations and/or monitoring codes are:

1. Water Quality Standards (9 VAC 25-260-et al.)
2. Water Quality Management Plan
3. Federal Effluent Guidelines (40 CFR 430)
4. Designated thermal mixing zone, Section 316(a) of Clean Water Act and 9 VAC 25-260-20 B5
5. Best Professional Judgment

Table II-2
BASIS FOR EFFLUENT LIMITATIONS

( ) Interim Limitations
(x) Final Limitations

OUTFALL: 002
SIC CODE: 2631

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	5D/Week	Measured
pH (Standard Units)	1	NA	NA	6.0	9.0	5D/Week	Grab
BOD_5 (mg/L)	2	NL	NA	NA	NL	1/Week	24 HC
Heat Rejected (BTU/hr)	4	NA	NA	NA	NL	1/Month	Calculated
Temperature	4	NA	NA	NA	NL °C	2D/Week	IS
Color (PCU)	5	NA	NA	NA	NL	1/Week	24 HC
BOD_5, intake (mg/L)	2	NL	NA	NA	NL	1/Week	24 HC

NA = Not Applicable;
24 HC = 24 hour composite
2D/Week = 2 days per week

NL = No Limitations; monitoring only
IS = Immersion Stabilization
5D/Week = 5 days per week

PCU = Platinum Cobalt Units

The basis for the limitations and/or monitoring codes are:
1. Water Quality Standards (9 VAC 25-260-et al.)
2. Water Quality Management Plan
3. Federal Effluent Guidelines (40 CFR 430)
4. Designated thermal mixing zone, Section 316(a) of Clean Water Act and 9 VAC 25-260-20 B5
5. Best Professional Judgment

Table II-3
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 003
SIC CODE: 2631

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH (Standard Units)	1,3	NA	NA	6.0	9.0	5D/Week	Grab
BOD_5	2	NL mg/L 2105 kg/d	NA	NA	NL mg/L 4210 kg/d	1/Week	24 HC
Total Suspended Solids	3	NL mg/L 6177 kg/d	NA	NA	NL mg/L 12,206 kg/d	1/Week	24 HC
Temperature, °C	1	NA	NA	NA	NL	1/Week	IS
Temperature upstream of outfall, °C	1	NA	NA	NA	NL	1/Week	IS
pH, S.U., upstream of outfall	1	NA	NA	NL	NL	1/Week	Grab
Color, PCU	4	NA	NA	NA	NL	1/Week	24 HC
Toxicity (TU_c)	1	NA	NA	NA	25.00	1/Year	24 HC

NA = Not Applicable
NL = No Limitations; monitoring only
TIRE= totalizing, indicating, recording equipment

IS = Immersion Stabilization
24 HC = 24 hour composite

5D/Week = 5 days per week
PCU = Platinum Cobalt Units

The basis for the monitoring and/or limitations codes are:
1. Water Quality Standards (9 VAC 25-260-et al.)
2. Water Quality Management Plan
3. Federal Effluent Guidelines (40 CFR 430—Subpart F and Subpart J)
4. Best Professional Judgment

Table II-4
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 301
SIC CODE: 4952

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	1/Day	Estimate
pH (Standard Units)	3	NA	NA	6.0	9.0	1/Day	Grab
BOD_5	1	30 mg/L 4500 g/d	NA	NA	45 mg/L 6800 g/d	1/ 6 Months	Grab
Total Suspended Solids	1	30 mg/L 4500 g/d	NA	NA	45 mg/L 6800 g/d	1/ 6 Months	Grab
Total Residual Chlorine, TRC (mg/L)	4	NA	NA	NL	NA	1/Day	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:

1. Federal Effluent Guidelines: Federal Technology-Based Secondary Treatment Regulation (40 CFR Part 133)
2. Best Professional Judgment
3. Water Quality Standards
4. Other- Disinfection Requirements

Table II-5
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 555 (similar outfalls 005, 007, 009, 010, 013)
SIC CODES: 2631

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/ Year	Estimate
pH (Standard Units)	3	NA	NA	6.0	9.0	1/Year	Grab
BOD_5 (mg/L)	4	NA	NA	NA	NL	1/Year	Grab
Total Suspended Solids (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/L)	6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-6
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 012
SIC CODES: 2631

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/Year	Estimate
pH (Standard Units)	3	NA	NA	6.0	9.0	1/Year	Grab
BOD_5 (mg/L)	4	NA	NA	NA	NL	1/Year	Grab
Total Suspended Solids (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/L)	6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:

1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-7
BASIS FOR EFFLUENT LIMITATIONS

( ) Interim Limitations
(x) Final Limitations

OUTFALL: 014
SIC CODES: 2631

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/ 3 Months	Estimate
pH (Standard Units)	3	NA	NA	6.0	9.0	1/Year	Grab
BOD_5 (mg/L)	4,6	NA	NA	NA	NL	1/Year	Grab
Total Suspended Solids (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
COD (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/l)	6	NA	NA	NA	NL	1/Year	Grab
Copper, Total Recoverable (µg/L)	6	NA	NA	NA	NL	1/ 3 Months	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-8
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 015
SIC CODES: 2631

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/Year	Estimate
BOD_5 (mg/L)	4	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/L)	6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:

1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-9
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 017
SIC CODES: 2631

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/Year	Estimate
BOD_5 (mg/L)	4	NA	NA	NA	NL	1/Year	Grab
Total Suspended Solids (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Chemical Oxygen Demand (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/L)	6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:

1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-10
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 018
SIC CODES: 2631

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/Year	Estimate
pH (Standard Units)	3	NA	NA	6.0	9.0	1/Year	Grab
BOD_5 (mg/L)	4	NA	NA	NA	NL	1/Year	Grab
Total Suspended Solids (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/L)	6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-11
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 021
SIC CODES: 2631

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/ 3 Months	Estimate
pH (Standard Units)	3	NA	NA	6.0	9.0	1/Year	Grab
BOD_5 (mg/L)	4,6	NA	NA	NA	NL	1/Year	Grab
Total Suspended Solids (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Zinc, Total Recoverable (μg/L)	6	NA	NA	NA	NL	1/ 3 Months	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-12
BASIS FOR EFFLUENT LIMITATIONS

OUTFALLS: 022
SIC CODE: 4953

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/Year	Estimate
Total Suspended Solids (mg/L)	5	NA	NA	NA	NL	1/Year	Grab
Iron, Total Recoverable (mg/L)	5,6	NA	NA	NA	NL	1/Year	Grab
Nitrate plus Nitrite (mg/L)	6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-13
BASIS FOR EFFLUENT LIMITATIONS

OUTFALLS: 023
SIC CODE: 4953

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/Year	Estimate
Total Suspended Solids (mg/L)	5,6	NA	NA	NA	NL	1/Year	Grab
COD (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Iron, Total Recoverable (mg/L)	5,6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6 Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-14
BASIS FOR EFFLUENT LIMITATIONS

OUTFALLS: 025
SIC CODE: 4953

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/Year	Estimate
Total Suspended Solids (mg/L)	5,6	NA	NA	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/L)	6	NA	NA	NA	NL	1/Year	Grab
Iron, Total Recoverable (mg/L)	5,6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6 Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-15
BASIS FOR EFFLUENT LIMITATIONS

( ) Interim Limitations
(x) Final Limitations

OUTFALLS: 028
SIC CODE: 4953

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MG)	NA	NA	NA	NA	NL	1/Year	Estimate
Total Suspended Solids (mg/L)	5	NA	NA	NA	NL	1/Year	Grab
Iron, Total Recoverable (mg/L)	5,6	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Sector B – Paper & Allied Products
5. Sector L – Landfills, Land Application Sites, and Open Dumps
6. Storm Water Monitoring Above Screening Criteria – Monitoring Required

Table II-16
BASIS FOR EFFLUENT LIMITATIONS

OUTFALL: 999
SIC CODE: 2631

( ) Interim Limitations
(x) Final Limitations

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
BOD_5	4	2105 kg/d	NA	NA	4210 kg/d	1/Month	Calculated
Heat Rejected	2	NA	NA	NA	67.2 million BTU/hr	1/Month	Calculated
Color Rise	2	NA	NA	NA	70 PCU	1/Month	Calculated

NA = Not Applicable
NL = No Limitations; monitoring only

The basis for the monitoring and/or limitations codes are:
1. Federal Effluent Guidelines
2. Best Professional Judgment
3. Water Quality Standards
4. Other: Water Quality Management Plan

Table III-1
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
001	BOD_5			NL mg/L maximum	NL mg/L monthly average, NL mg/L maximum	Monthly average reporting added to be consistent with outfall 999 reporting for total BOD_5.	2/5/10
001	BOD_5, intake (mg/L)			NL mg/L maximum	NL mg/L monthly average, NL mg/L maximum	Monthly average reporting added to be consistent with outfall 999 reporting for total BOD_5.	2/5/10
001	Total Residual Chlorine	1/Day	NA	0.12 mg/L monthly average; 0.024 mg/L daily maximum	NA	The facility no longer uses chlorine to disinfect the river raw water. Therefore, this limit is no longer needed.	2/5/10
001	Temperature	5 Days/Week	2 Days/Week			The facility qualifies for a reduction in monitoring frequency.	2/5/10
001	Color	5 Days/Week	1/Week			The facility qualifies for a reduction in monitoring frequency.	2/5/10
002	BOD_5			NL mg/L maximum	NL mg/L monthly average, NL mg/L maximum	Monthly average reporting adding to be consistent with outfall 999 reporting for total BOD_5.	2/5/10
002	BOD_5, intake (mg/L)			NL mg/L maximum	NL mg/L monthly average, NL mg/L maximum	Monthly average reporting adding to be consistent with outfall 999 reporting for total BOD_5.	2/5/10

Table III-2
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
002	Total Residual Chlorine	1/Day	NA	0.12 mg/L monthly average; 0.024 mg/L daily maximum	NA	The facility no longer uses chlorine to disinfect the river raw water. Therefore, this limit is no longer needed.	2/5/10
002	Temperature	5 Days/Week	2 Days/Week			The facility qualifies for a reduction in monitoring.	2/5/10
002	Color	5 Days/Week	1/Week			The facility qualifies for a reduction in monitoring.	2/5/10
003	Total Suspended Solids (TSS)	5 Days/Week	1/Week	NL mg/L, 5838 kg/d monthly average; NL mg/L, 11,547 kg/d daily maximum	NL mg/L, 6177 kg/d monthly average; NL mg/L, 12,206 kg/d daily maximum	The TSS loading limits were increased because the monthly average and daily average production increased.	2/5/10
003	BOD_5	5 Days/Week	1/Week			The facility qualifies for a reduction in monitoring frequency.	2/5/10
003	Color	5 Days/Week	1/Week			The facility qualifies for a reduction in monitoring frequency.	2/5/10
003	Total Phosphorus	1/Week; 1/Month (calculated)	NA NA	NL mg/L, NL kg/d monthly average; NL kg/month	NA	This facility is listed as a significant discharger to a tributary to the Chesapeake Bay. Monitoring for this parameter has been included in the facility's general nutrient watershed permit.	2/5/10

Table III-3
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
003	Total Phosphorus (kg/calendar year)	1/Month (Calculated)	NA	NL kg/calendar year	NA	This facility is listed as a significant discharger to a tributary to the Chesapeake Bay. Monitoring for this parameter has been included in the facility's general nutrient watershed permit.	2/5/10
003	Orthophosphate	1/Week	NA	NL mg/L, NL kg/d monthly average	NA	This facility is listed as a significant discharger to a tributary to the Chesapeake Bay. Monitoring for this parameter has been included in the facility's general nutrient watershed permit.	2/5/10
003	Total Kjeldahl Nitrogen as N (TKN)	1/Week	NA	NL mg/L, NL kg/d monthly average	NA	This facility is listed as a significant discharger to a tributary to the Chesapeake Bay. Monitoring for this parameter has been included in the facility's general nutrient watershed permit.	2/5/10
003	Nitrate plus Nitrite (as N)	1/Week	NA	NL mg/L, NL kg/d monthly average	NA	This facility is listed as a significant discharger to a tributary to the Chesapeake Bay. Monitoring for this parameter has been included in the facility's general nutrient watershed permit.	2/5/10
003	Total Nitrogen	Calculated - -1/Week; 1/Month	NA	NL mg/L, NL kg/d monthly average; NL kg/month	NA NA	This facility is listed as a significant discharger to a tributary to the Chesapeake Bay. Monitoring for this parameter has been included in the facility's general nutrient watershed permit.	2/5/10
003	Total Nitrogen (kg/calendar year)	Calculated - -1/Month	NA	NL kg/calendar year	NA	This facility is listed as a significant discharger to a tributary to the Chesapeake Bay. Monitoring for this parameter has been included in the facility's general nutrient watershed permit.	2/5/10
003	Whole Effluent Toxicity (TU_c)	1/ 3 Months	1/Year			All monitoring data were significantly below the limit, so the monitoring frequency was reduced to annual.	2/5/10
301	BOD_5	1/Month	1/ 6 Months			The facility qualifies for a reduction in monitoring frequency.	2/5/10
301	TSS	1/Month	1/ 6 Months			The facility qualifies for a reduction in monitoring.	2/5/10

Table III-4
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
555	Flow	1/ 3 Months	1/Year			Flow monitoring frequency has been decreased to annual in conjunction with the annual monitoring frequency for all other parameters.	2/5/10
555	Copper, Dissolved	1/ 3 Months	NA			Monitoring frequency has been discontinued because all data collected during the permit term were below the screening criterion.	2/5/10
555	Total Kjeldahl Nitrogen	NA	1/Year	NA	NL mg/L maximum	Monitoring required because data collected during the permit term were above the screening criterion.	2/5/10
012	Nitrate plus Nitrite	1/Year	NA			Monitoring no longer required because data collected during the permit term were below the screening criterion.	2/5/10
012	Total Kjeldahl Nitrogen	NA	1/Year	NA	NL mg/L maximum	Monitoring required because data collected during the permit term were above the screening criterion.	2/5/10
014	Chemical Oxygen Demand	NA	1/Year	NL mg/L maximum	NA	Monitoring required because data collected during the permit term were above the screening criterion.	2/5/10
014	Total Kjeldahl Nitrogen	NA	1/Year	NA	NL mg/L maximum	Monitoring required because data collected during the permit term were above the screening criterion.	2/5/10
014	Copper, Dissolved	1/ 3 Months	NA	NL mg/L maximum	NA	The revised screening criterion was based upon a benchmark value which was given in total recoverable form. So, dissolved copper monitoring has been replaced by total recoverable copper monitoring.	2/5/10
014	Copper, Total Recoverable	NA	1/ 3 Months	NA	NL mg/L maximum	The revised screening criterion was based upon a benchmark value which was given in total recoverable form. So, total recoverable copper monitoring has been required.	2/5/10
015	Total Kjeldahl Nitrogen	NA	1/Year	NA	NL mg/L maximum	Monitoring required because data collected during the permit term were above the screening criterion.	2/5/10
017	Flow	1/ 3 Months	1/Year			Flow monitoring frequency has been decreased to annual in conjunction with the annual monitoring frequency for other parameters.	2/5/10

Table III-5
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
017	Total Kjeldahl Nitrogen	NA	1/Year	NA	NL mg/L maximum	Monitoring required because data collected during the permit term were above the screening criterion.	2/5/10
017	Copper, Dissolved	1/ 3 Months	NA	NL µg/L maximum	NA	Monitoring no longer required because data collected during the permit term were below the screening criterion.	2/5/10
017	Chemical Oxygen Demand	NA	1/Year	NA	NL mg/L maximum	Monitoring required because data collected during the permit term were above the screening criterion.	2/5/10
018	Flow	1/ 3 Months	1/Year			Flow monitoring frequency has been decreased to annual in conjunction with the annual monitoring frequency for all other parameters.	2/5/10
018	Total Kjeldahl Nitrogen	NA	1/Year	NA	NL mg/L maximum	Monitoring required because data collected during the permit term were above the screening criterion.	2/5/10
021	Zinc, Dissolved	1/ 3 Months	NA	NL mg/L maximum	NA	The revised screening criterion was based upon a benchmark value which was given in total recoverable form. So, dissolved zinc monitoring has been replaced by total recoverable zinc monitoring.	2/5/10
021	Zinc, Total Recoverable	NA	1/ 3 Months	NA	NL mg/L maximum	The revised screening criterion was based upon a benchmark value which was given in total recoverable form. So, total recoverable zinc monitoring has been required.	2/5/10
023	Nitrate plus Nitrite	1/Year	NA	NL mg/L maximum	NA	Monitoring no longer required because data collected during the permit tem were below the screening criterion.	2/5/10
023	Total Kjeldahl Nitrogen	NA	1/Year	NA	NL mg/L maximum	Monitoring required because 1data point collected during the permit term was above the screening criterion.	2/5/10

Table III-6
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
025	Total Kjeldahl Nitrogen	NA	1/Year	NA	NL mg/L maximum	Monitoring required because 1data point collected during the permit term was above the screening criterion.	2/5/10
026	Flow	1/Year	NA	NL, MG	NA	This outfall qualifies for a no exposure exemption from monitoring requirements.	2/5/10
026	Total Suspended Solids	1/Year	NA	NL mg/L, maximum	NA	This outfall qualifies for a no exposure exemption from monitoring requirements.	2/5/10
026	Iron, Total Recoverable	1/Year	NA	NL mg/L, maximum	NA	This outfall qualifies for a no exposure exemption from monitoring requirements.	2/5/10

Attachment A

Flow Frequency Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
3019 Peters Creek Road Roanoke, Virginia 24019

SUBJECT: Flow Frequency Determination
GP Big Island LLC – Reissuance (VA0003026)

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior BJF

DATE: November 24, 2009 (Revised 5/12/10)

COPIES:

This memorandum supersedes the May 20, 2005 memorandum concerning the subject VPDES permit.

GP Big Island discharges via several outfalls to the James River, one storm water outfall to Reed Creek, and four storm water outfalls to unnamed tributaries. All of these outfalls are located near Big Island, Virginia. Stream flow frequencies are required at this site to develop effluent limitations for the VPDES permit.

The USGS has operated a continuous record gauge downstream of the discharges on the James River at Holcombs Rock, Virginia (#02025500) since 1939. The flow has been regulated by Gathright Dam at Lake Moomaw since 1979. The flow frequencies for the discharge points were determined using drainage area proportions and have been reduced by the outfall discharges below and including the discharge point. This analysis does not address any other withdrawals, discharges, or springs that may lie between the gauge and outfalls. The high flow months are January through May. Flow frequencies for outfalls 001, 002, and 003 are listed on the attached table. The other outfalls consist of only storm water, and therefore flow frequencies are not needed to determine water quality criteria applicable to these discharges.

Flow Frequency Determination: GP Big Island

High Flow Months January through May

Reference Gauge (data from 1980 to 2003)
James River at Holcombs Rock, VA (#02025500)

Drainage Area [mi^2] = 3,259

	ft^3/s	MGD		ft^3/s	MGD
1Q10 =	393	254	High Flow 1Q10 =	762	492
7Q10 =	511	330	High Flow 7Q10 =	892	576
30Q5 =	638	412	HM =	1,560	1,008
30Q10=	582	376	High Flow 30Q10=	1,080	698

Flow frequencies for the reissued permit (6/29/10)
James River above Outfall 003

Drainage Area [mi^2] = 3,134.0

	ft^3/s	MGD		ft^3/s	MGD
1Q10 =	369	239	High Flow 1Q10 =	724	468
7Q10 =	483	312	High Flow 7Q10 =	849	549
30Q5 =	614	397	HM =	1,491	964
30Q10=	551	356	High Flow 30Q10=	1,030	666

Flow frequencies for reissuance date of permit (06/29/10)
James River above Outfall 001

Drainage Area [mi^2] = **3,105.0**

	ft^3/s	MGD		ft^3/s	MGD
1Q10 =	365	236	High Flow 1Q10 =	720	465
7Q10 =	479	309	High Flow 7Q10 =	845	546
30Q5 =	601	388	HM =	1,488	961
30Q10=	547	354	High Flow 30Q10=	1,026	663

Flow frequencies for the reissued permit (6/29/10)
James River above Outfall 002

Drainage Area [mi^2] = 3,105.0

	ft^3/s	MGD		ft^3/s	MGD
1Q10 =	366	236	High Flow 1Q10 =	720	466
7Q10 =	479	310	High Flow 7Q10 =	845	546
30Q5 =	601	388	HM =	1,488	961
30Q10=	547	354	High Flow 30Q10=	1,026	663

Outfall 001	unadjusted flow-001 discharge-002 discharge-003 discharge
Outfall 002	unadjusted flow-002 discharge-003 discharge
Outfall 003	unadjusted flow - 003 discharge

Discharges

Outfall	Maximum 30 Average (MGD)
Outfall 001	0.12
Outfall 002	3.65
Outfall 003	8.76

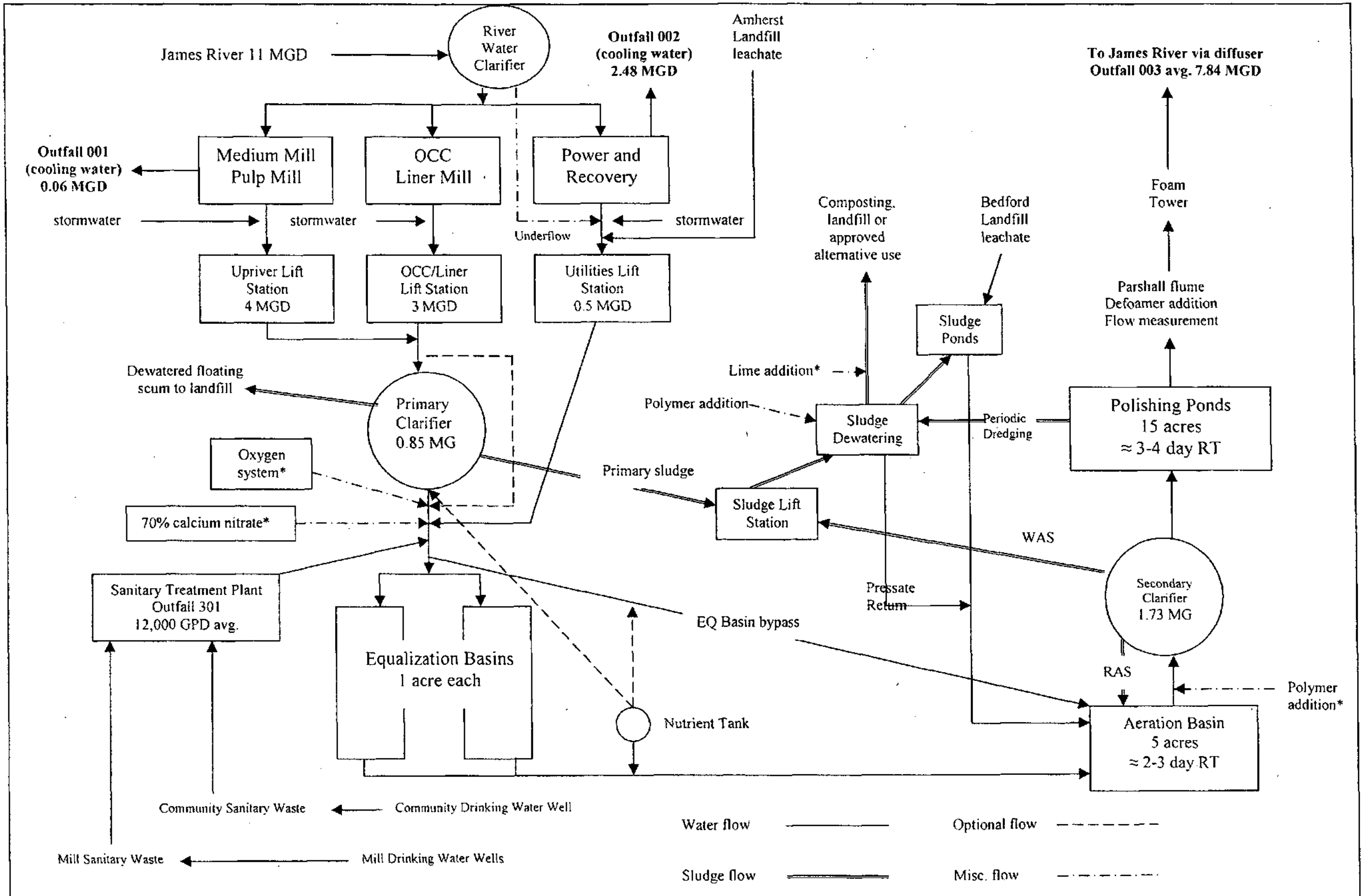
SITEID	NAME	RECORD	LATLONG	DAAREA	HARMEAN	HF30Q10	HF7Q10	HF1Q10	Z30Q5	Z30Q10	Z7Q10	Z1Q10	Z1Q30	HFMTHS	Statperiod	Yrsfm	Notes
02025500	James River at Holcombs Rock, Va.	R, 1926-	Lat 37 30'05", Long 79 15'45", NAD 83	3,259	1560	1080	892	762	638	582	511	393	310	JAN-MAY	1980-2003	2005	Flow regulated by Lake Moomaw since Dec 1979

Attachment B

Maps and Diagrams

- **Water Flow Diagram**
- **Wastewater/ Sludge Flow Diagram**
- **Outfall Location Maps**
- **Topographic Map**

Attachment to Form 2C
GP Big Island, LLC
Water Flow Diagram



NOTE: * as needed for operational efficiency

Attachment D to Form 2C
Treatment Unit Capacities
GP Big Island, LLC
VPDES Permit No. VA0003026

Average Flow Rate (Q_{AVG}): 7.84 MGD
Design Flow Rate: 10.87 MGD

<u>PRIMARY CLARIFIER</u>

Number:	1
Diameter:	110 feet
Sidewall Depth:	12 feet
Storage Capacity:	0.85 MG

<u>EQUALIZATION BASINS</u>

Number:	2
Depth (per basin):	10.5 feet
Surface Area (per basin):	1 acre
Storage Capacity (per basin):	3.42 MG
Detention Time (both basins):	0.87 day at Q_{AVG}

<u>AERATION BASIN</u>

Number:	1
Depth:	12 feet
Surface Area:	5 acres
Storage Capacity:	19.5 MG
Detention Time:	2.48 days at Q_{AVG}

<u>SECONDARY CLARIFIER</u>

Number:	1
Diameter:	140 feet
Sidewall Depth:	15 feet
Storage Capacity:	1.73 MG

<u>POLISHING POND</u>

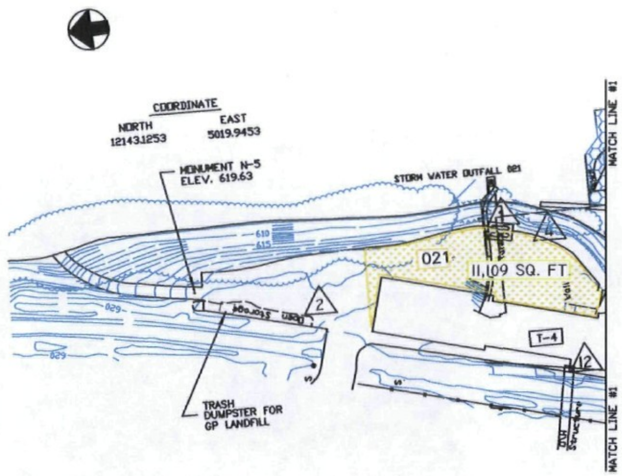
Number:	1
Depth:	6 feet
Surface Area:	15 acres
Storage Capacity:	29.3 MG
Detention Time:	3.73 days at Q_{AVG}

<u>SLUDGE DEWATERING SYSTEM</u>

(2) 100,000 gallon sludge holding/decant tanks
(1) polymer dilution system
(2) sludge feed pumps
(1) comminutor
(1) 2-meter belt filter press

<u>SLUDGE DEWATERING LAGOONS</u>

Number:	2
Depth:	6 feet
Surface Area (total):	6.5 acres
Storage Capacity (total):	12.7 MG



5	7/22/19	

Georgia-Pacific

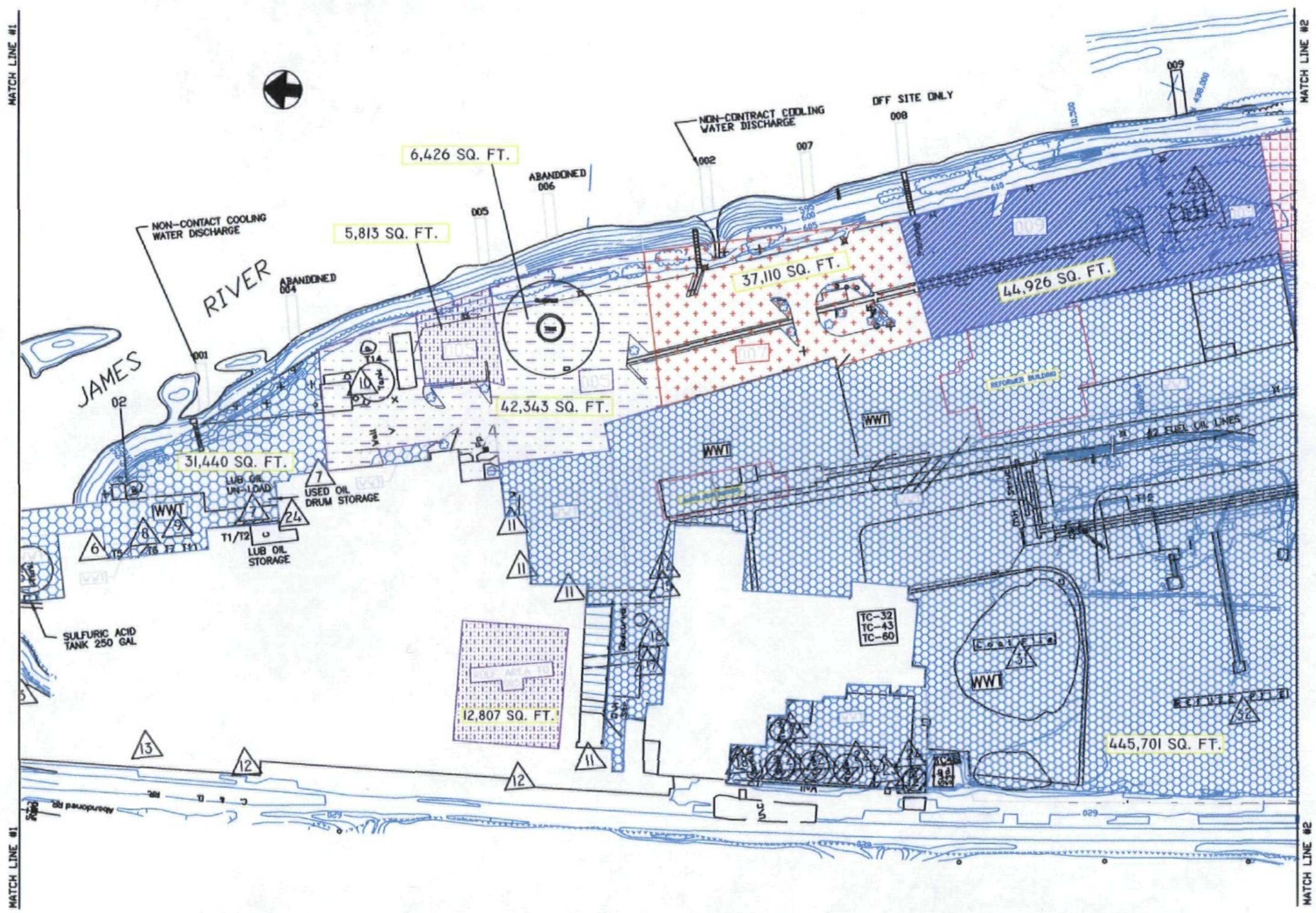
7/22/1988
1"=50'
MOD
299/G/5932-1

GENERAL ARRANGEMENT
AREA 1
EFFLUENT DISPOSAL

5932-1

1 of 7

5



DATE 7/22/1988	
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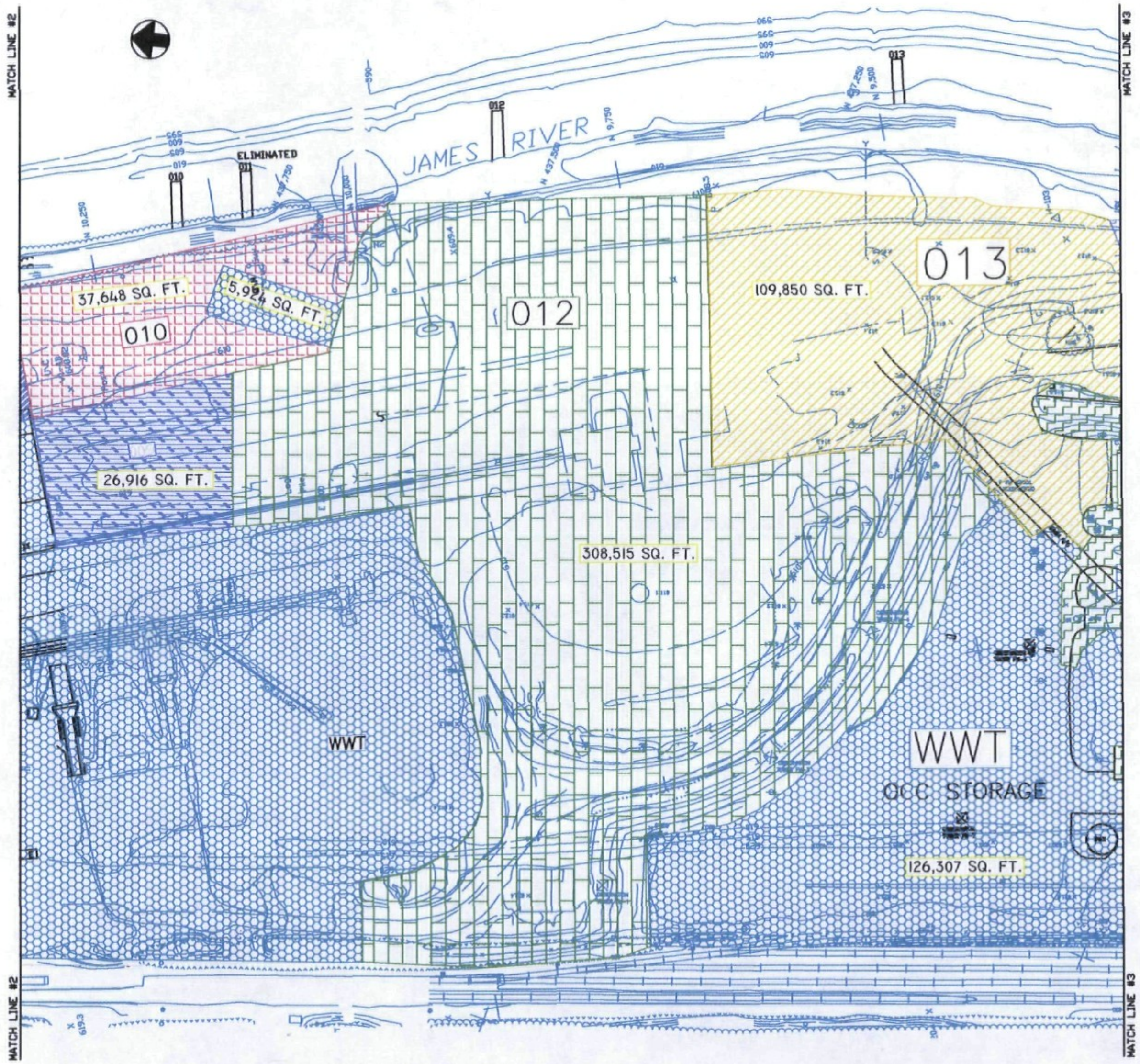
GENERAL ARRANGEMENT
AREA 2
EFFLUENT DISPOSAL

Georgia-Pacific

DRAWING NUMBER 5932-2

SHEET 2 of 7

REV. 5



		DATE	BY	CHK'D	APP'D		REVISION DESCRIPTION
		8/95	MOD	RS			CHANGED NEW OCC STORAGE AREA TO WWT

Georgia-Pacific

DATE 6/17/97
SCALE 1"=50'
DRAWN MOD

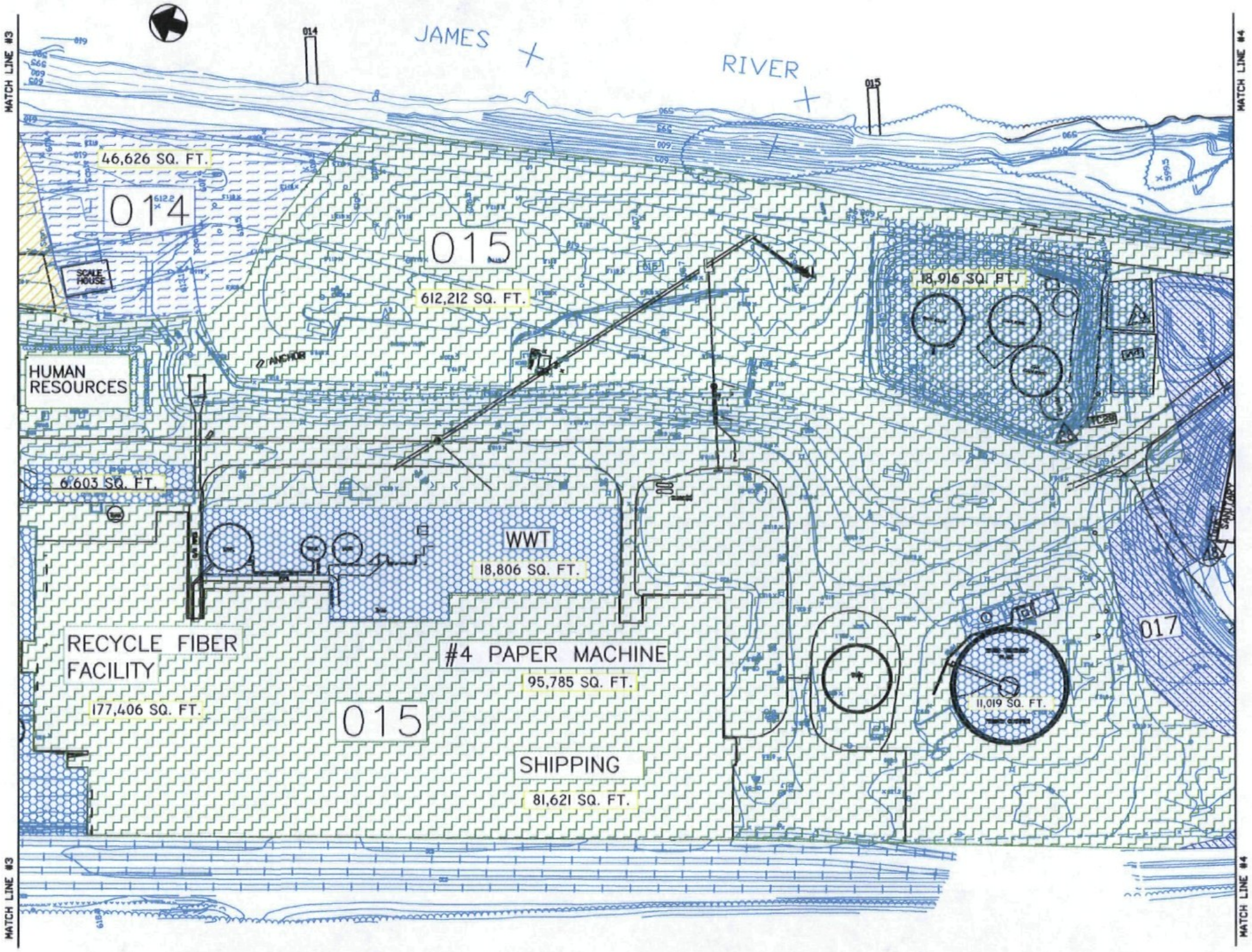
5932-3

GENERAL ARRANGEMENT
AREA 3
EFFLUENT DISPOSAL

5932-3

3 of 7

0

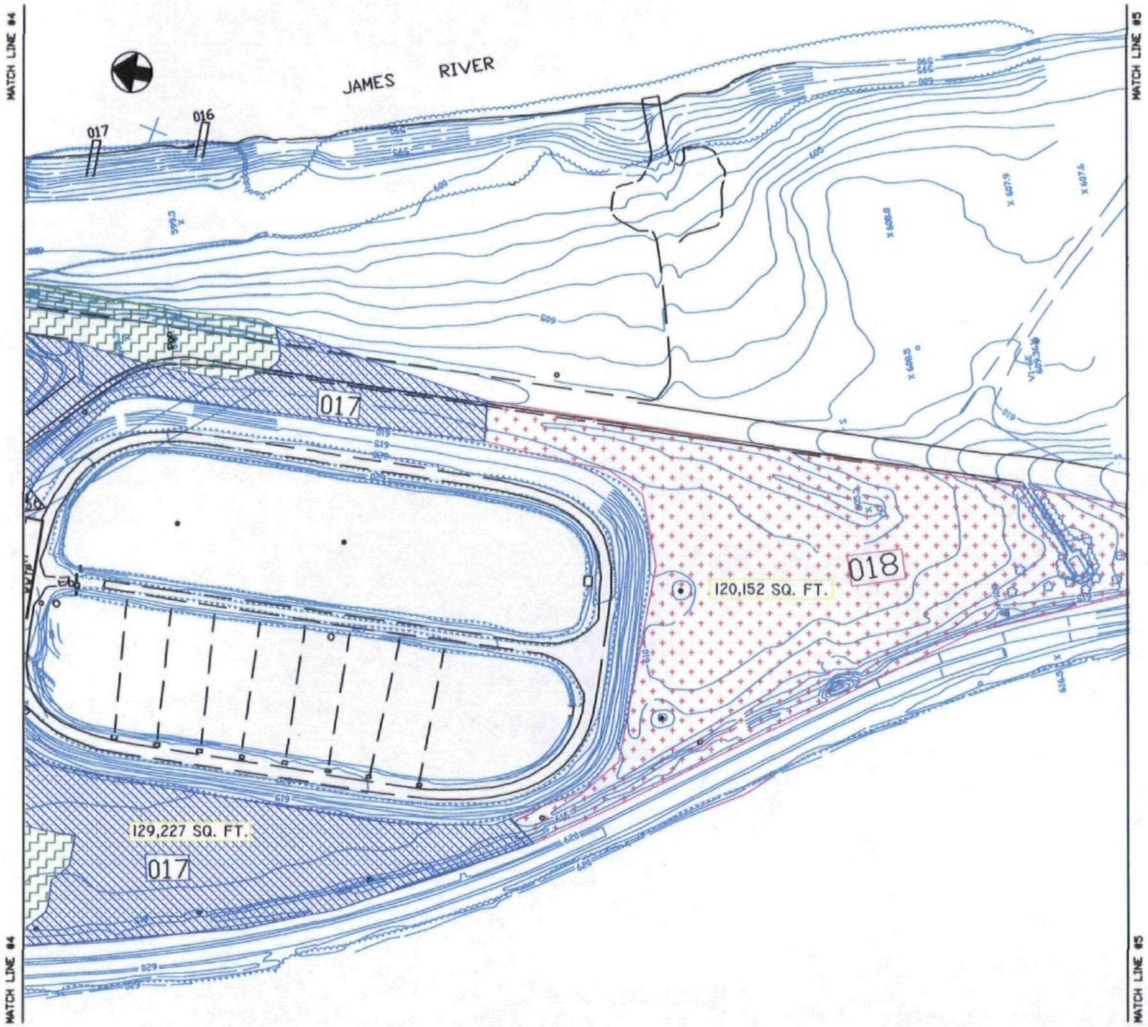


Georgia-Pacific	
DATE 6/17/97	
SCALE 1"=50'	
DRAWN MOD	
	5932-4

GENERAL ARRANGEMENT
AREA 4
EFFLUENT DISPOSAL

5932-4

4 of 7



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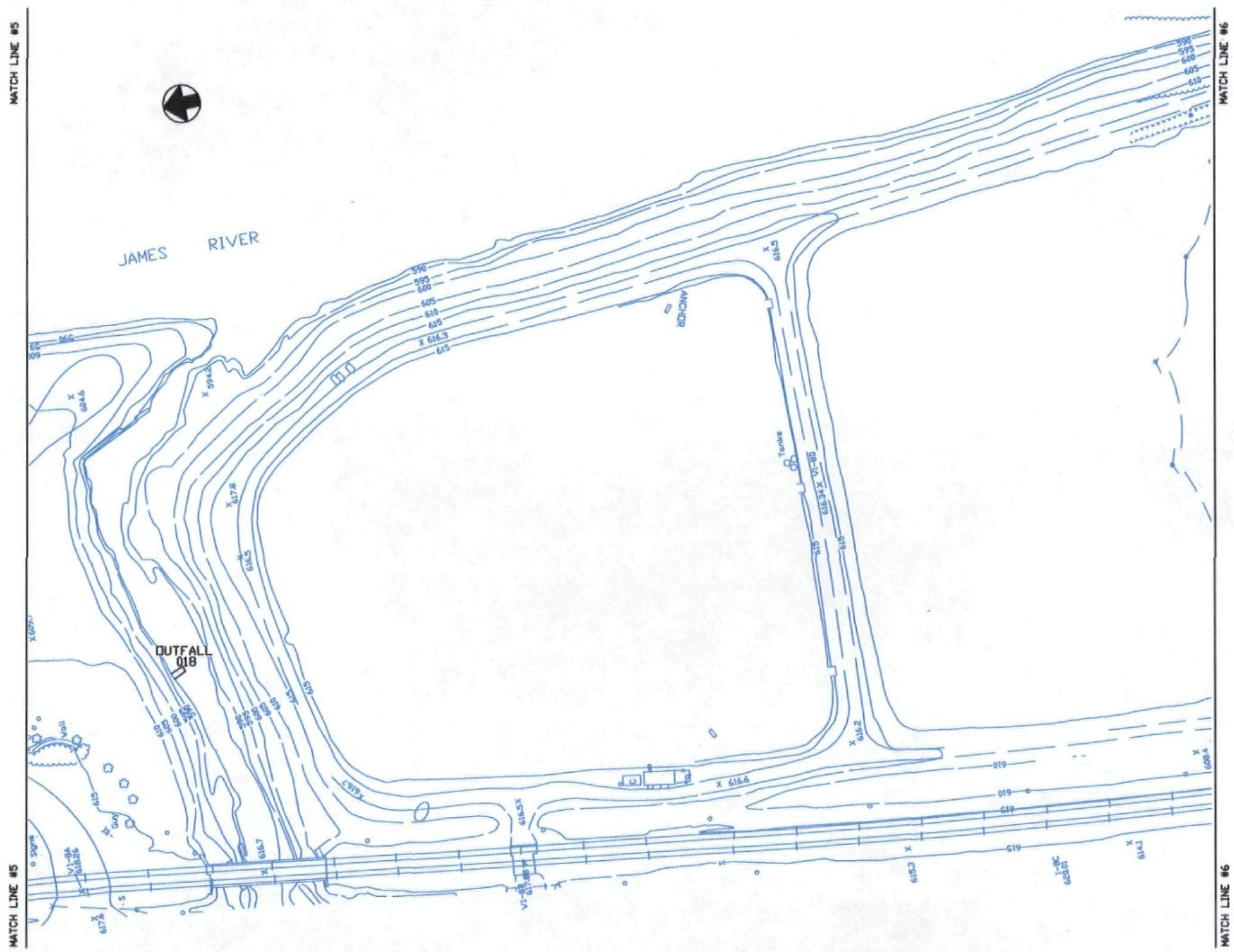
MOD		EFFLUENT DISPOSAL
	5932-5	

Georgia-Pacific

5932-5

5 7 | 0



6/17/97		GENERAL ARRANGEMENT AREA 6 EFFLUENT DISPOSAL
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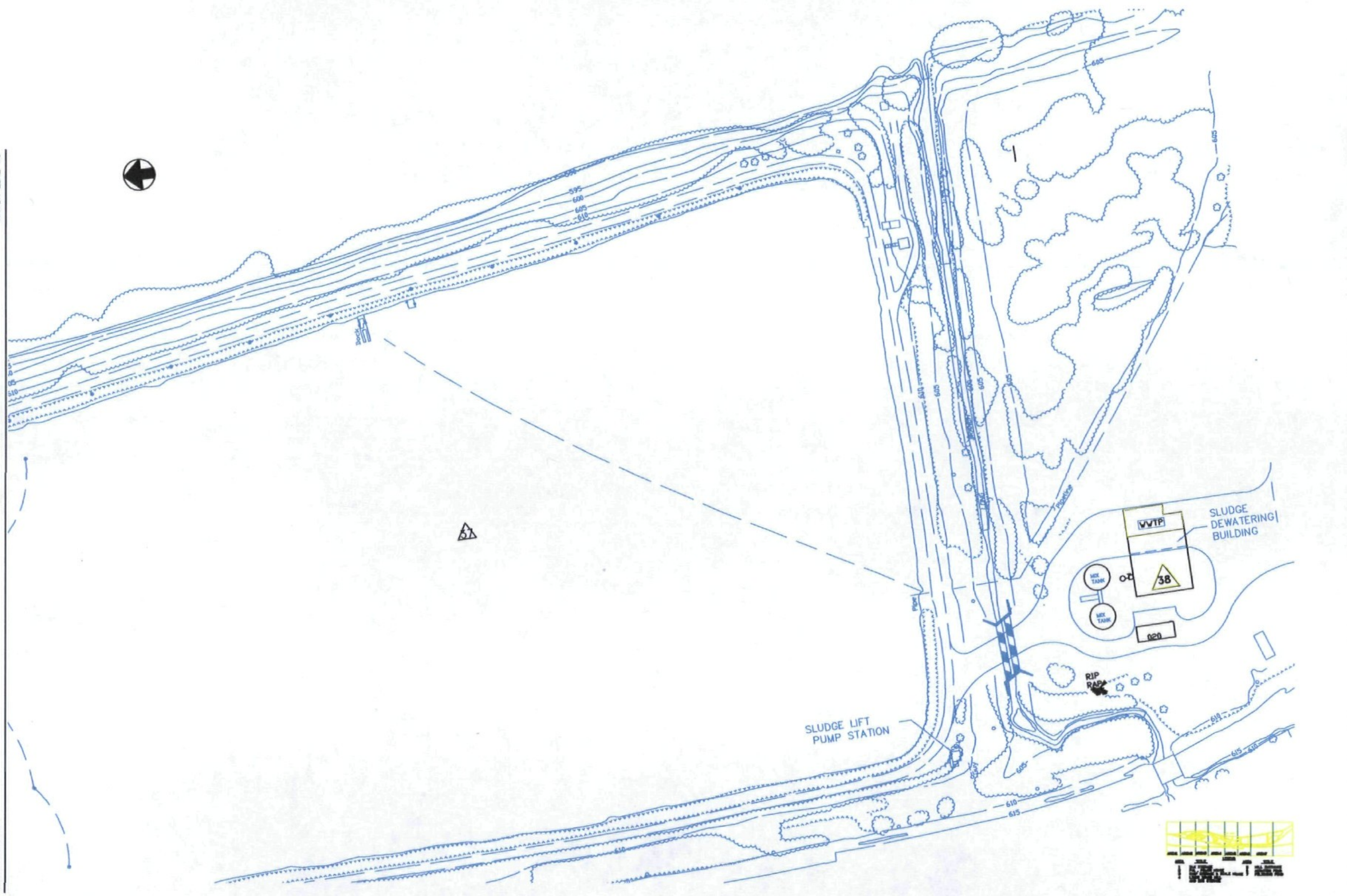
MOD	5932-6	
Georgia-Pacific	5932-6	6 7 0



6/17/97		GENERAL ARRANGEMENT AREA 7 EFFLUENT DISPOSAL
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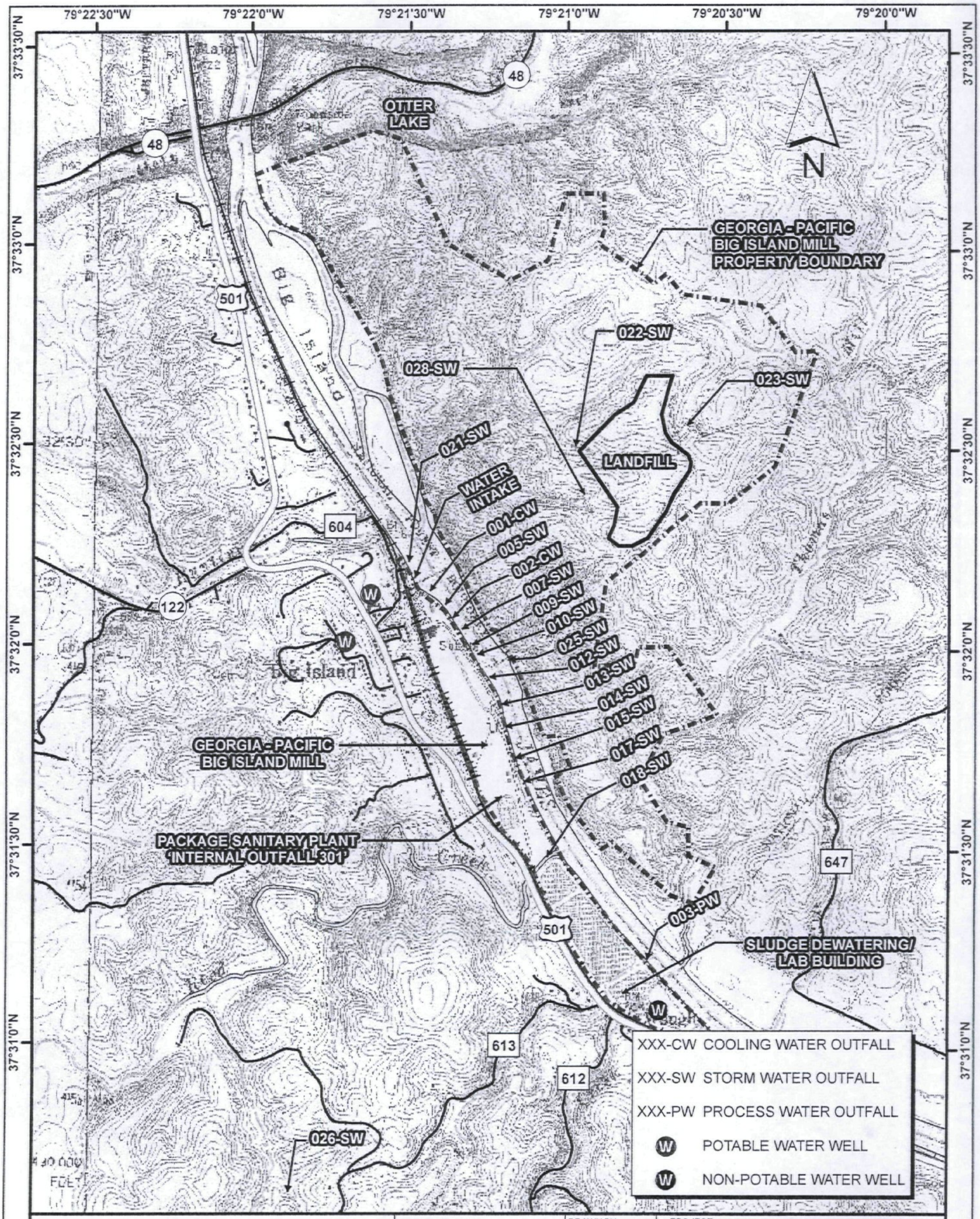
MOD		
	5932-7	
	5932-7	7 7 0

Georgia-Pacific



IF THIS DRAWING IS A REDUCTION
GRAPHIC SCALE MUST BE USED

U.S. Geological Survey. 1:24,000. 7.5 Minute Series

2,000 0 2,000 Feet

WW ENGINEERS SURVEYORS PLANNERS ASSOCIATES

DRAWN BY: CLP	PROJECT: GEORGIA - PACIFIC BIG ISLAND PAPER MILL
REVIEWED BY: HFW	
FILE NAME: USGSMap.mxd	TITLE: GP ~ OUTFALLS
PROJECT NUMBER: 209078.00	Scale: 1" = 2,000 FT · Date: 11/17/09 · Figure: 3 - 1

Attachment C

Facility Information

- Site Inspection Report
- Chemical Storage Information
- Material Storage Information for PCB Monitoring

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Site Inspection Report for GP Big Island
Reissuance of VPDES Permit No. VA0003026

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior BLF

DATE: October 21, 2009 (Revised 4/20/10, 5/12/10)

On October 8, 2009, site visit was conducted of the wastewater works at GP Big Island. Tim Pierce, Environmental Manager, and Julie Baty, Environmental Supervisor, were present at the inspection. GP Big Island produces unbleached rolls of corrugated medium and linerboard. Hardwood chips and secondary fiber are used to manufacture the paper rolls. Secondary fiber (recycled waste paper) consists of old corrugated containers (OCC), mixed office waste (MOW), and double lined kraft clippings (DLK). To make paper the fibers are broken down into pulp. Wood chips are broken down using the semichemical process, and waste paper is broken down by hydropulping.

The facility has its own power and steam generators, black liquor recovery system, and water treatment system. Spent black liquor is combusted in a chemical furnace to recover molten sodium carbonate which is redissolved in water to produce new pulping liquor. GP Big Island constructed a new recovery furnace and smelt dissolving tank to replace the black liquor smelters and existing smelt dissolving tanks.

Sewage Treatment Facility

Sanitary wastewater from the mill employees and approximately 25 residences in the community of Big Island is treated in a 40,000 gpd activated sludge package treatment plant. The treatment system consists of an inlet bar screen, comminutor, surge tank, diffused air aeration basin, clarifier, 8,000-gallon aerated sludge holding basin, tablet chlorinator, baffled chlorine contact tank, and v-notched weir with an ultrasonic flow meter.

Industrial Wastewater Treatment

The industrial treatment system works consists of three lift stations, a primary clarifier, two equalization basins, an aeration basin, secondary clarifier, polishing pond, Parshall flume, foam tower, diffuser, and sludge handling facilities. Process wastewater; contaminated storm water from the woodyard areas, coal storage areas, and various chemical storage areas and process areas; and noncontact cooling water are treated by this system.

Primary Clarifier
Process wastewater from the OCC recycled facility, pulp mill, and Nos. 1, 3, and 4 paper machines is pumped via lift stations to the primary clarifier. A scum arm deposits floating scum in a trough. The scum is conveyed to an inclined dewatering conveyor and then into a hopper which is manually removed for disposal at the mill's existing industrial landfill (Amherst Landfill). A wet well collects water removed from the scum, and this water is pumped back to the clarifier. Calcium nitrate may be added to control odor.

Equalization Basins

Wastewater flows via gravity from the primary clarifier and is pumped from the Main Lift Station into one of two equalization basins. The two equalization basins are each one-acre and have a total capacity of 6.8 million gallons. Aeration is utilized in each equalization basin as needed. The effluent from the power area bypasses the primary clarifier and also flows to these basins. The equalization basins treat primary clarifier effluent; raw wastewater from the powerhouse/recovery area; storm water from the woodyard, coal pile, and other process areas; and leachate from the mill's active landfill (Amherst Landfill). The effluent from the equalization basins discharges to the aeration basin. Nitrogen and phosphorus are added to the equalization basin effluent prior to mixing with the process wastewater at the inlet to the aeration basin. The nutrient feed rate is optimized to control excess nutrients in the effluent. At the time of the site visit, the equalization basins were covered with a sludge layer.

Aeration Basin and Secondary Clarifier

Wastewater from the equalization basin is discharged into the extended aeration basin. The aeration basin also receives pressate from the sludge press operations, decanted water from the sludge holding ponds, and leachate from the closed mill landfill (Bedford Landfill). The activated sludge basin covers approximately 5 acres and has a capacity of 20 million gallons. Air is supplied by surface aerators. At the time of the site visit, the aeration basin had a chocolate color with some solids on top. The effluent from the aeration basin flows into a concrete wet well, housing three pumps. The pumps lift the effluent into the above ground secondary clarifier. Sludge is concentrated to approximately 1 to 2 percent solids concentration in the clarifier and then metered to the head of the aeration basin or taken to the sludge dewatering facility as required. Overflow from the secondary clarifier gravity flows to the polishing pond.

Polishing Pond

The 15-acre polishing pond has two floating plastic curtains in the pond to prevent short-circuiting. When needed the polishing pond will be dredged and the sludge will be pumped to the sludge lift station or dewatered with portable presses.

A water-based defoamer may be added to the effluent before discharge. Effluent from the polishing pond is discharged through a Parshall flume to a foam tank. The effluent discharges to a 17 port diffuser that extends into the James River (outfall 003). There was no observed color in the receiving stream.

Industrial Sludge

Settled solids from the primary and secondary clarifiers are handled by the sludge dewatering system. Equalization basin sludge and dredged solids from the polishing pond are handled with portable presses or other means. The mill's sludge dewatering system includes a sludge press and gravity thickener.

A sludge lift station delivers the sludge to two 100,000-gallon agitated sludge holding tanks. Sludge from the tank is fed to the belt press. A comminutor shreds solids using a rotary cutter inside a screen basket. Polymer is injected into the sludge line after the sludge feed pump to promote flocculation. Then the sludge is pumped to a gravity thickener where the sludge is ridged and furrowed by a series of plow blades placed along the travel of the belt, allowing the water released from the sludge to pass through the belt. The gravity thickener is followed by a belt press where the water is pressed/removed from the sludge. Decanted liquid from the sludge dewatering system is collected in a sump and routed to the aeration basin.

Sludge solids drop onto a conveyor and lime may be added prior to falling into a concrete bunker. This industrial sludge is currently landfilled or hauled offsite to a composting operation. The site also has two sludge dewatering lagoons that are only used during maintenance activities and emergencies. The lagoons each have a decant pump which returns the supernatant to the head of the aeration basin. Dried sludge is excavated and transferred to the onsite landfill on an as needed basis.

Sewage Sludge

For sewage sludge there is an 8,000-gallon sludge holding tank. A septic tank hauler transports the contents of this tank approximately 12 times per year. Sewage sludge is disposed of at the City of Lynchburg WWTP.

Outfalls

There are 20 outfalls associated with this facility. Sixteen of these outfalls are associated with storm water only. Outfalls 001 and 002 consist of noncontact cooling water. Outfalls 001 and 002 are no longer chlorinated. At the time of the site visit there were discharges from outfall 001 and 002.

Outfall 003 is primarily process wastewater with some noncontact cooling water and contaminated storm water. Outfall 301 discharges treated sanitary wastewater to outfall 003.

GP Big Island is currently operating Phase II of their Amherst landfill. This landfill may receive waste from the industrial wastewater treatment system. The sediment basin for this section drains to outfall 028.

A spring which was previously classified as landfill leachate discharges downgradient of the closed Bedford landfill. The facility collects discharge from the spring and pumps it to a holding pond. A tanker truck periodically drains and hauls the water from the holding pond to the wastewater treatment facility. No water quality criteria exceedances of the spring water have occurred in the past eight sampling events. The final cover has been maintained during the postclosure care period, including reseeding, slope stabilization, and regular site inspections. Since the spring water is not contaminated it will be rerouted to the holding pond and discharged into the stream at outfall 026. This outfall may qualify for a no exposure exemption.

Attachment [illegible] to Form 2C
Process Materials Listed in Table 2C-4
GP Big Island, LLC
VPDES Permit No. VA0003026

Chemical	Location	Tank Capacity, Gallons	Treatment Provided
Sodium Hydroxide 50%	Utilities	38,730	In all cases of spills of these materials, materials will be recovered from containment or routed to the wastewater treatment system for complete treatment as appropriate. Aluminum sulfate if a commonly used coagulant that will primarily coagulate with primary solids and be removed in the primary clarifier. Diesel, gasoline, lube oils and hydraulic oils are fully treatable and removed in the extended aeration biological treatment process.
Sodium Hydroxide 50%	Linerboard Machine	13,535	
Sodium Hypochlorite 12.5%	Linerboard Machine	500	
Aluminum Sulfate	Water Treatment	8,000	
Aluminum Sulfate	Linerboard Machine	13,535	
Diesel	Tank Farm	125,000	
Diesel	Utilities	1,000	
Diesel	Woodyard	4,000	
Gasoline	Woodyard	1,000	
Lubrication oils	Various mill locations	5,000	
Hydraulic oils	Various mill locations	1,000	

Table   Chemical U ading Areas

Process Area	Unloading Area	Delivery By	Chemical/Material	Spill Containment/Disposal
Recovery	Rail siding	Rail Car	Caustic, Soda Ash	Area slopes toward trench which drains to process sewer and WWTP.
Recovery	Recovery Area Tank Farm Courtyard	Truck	Caustic, Soda Ash	Concrete pad, area slopes toward trench which drains to process sewer and WWTP.
Power House	Courtyard outside NE corner of Water Treatment Plant	Truck (totes or multi-compartment bulk	Caustic, Boiler Water Treatment, Defoamer	Paved area, slopes towards process sewer and WWTP.
Power House - Water Treatment	Courtyard outside NE corner of Water Treatment Plant	Truck (totes or multi-compartment bulk	Polymer, Salt, Alum	Paved area, slopes towards process sewer and WWTP.
Medium Mill	No. 3 Paper Machine Courtyard	Truck (totes)	Detergent or Caustic based cleaners, Defoamer, Oil	Paved area, slopes towards process sewer and WWTP.
Medium Mill	No. 3 Paper Machine Courtyard	Truck (bulk)	Defoamer, Feltwash	Paved area, slopes towards process sewer and WWTP.
Linerboard Mill	Additive unloading alleyway and south end of No. 4 PM basement	Truck (totes)	Detergent or Caustic based cleaner, Biocide, Defoamer, Shade control	Paved area, slopes towards process sewer and WWTP.
Linerboard Mill	Additive unloading alleyway	Truck (bulk or totes)	Defoamer, Detergent or caustic based cleaners, Polymer, Alum, Starch, Sizing, Antiskid	Paved area, slopes towards process sewer and WWTP.
Wastewater Treatment	Primary Clarifier	Truck (bulk)	Nitrogen/Phosphorus Blend (Nutrient)	Area is contained. Stormwater is pumped to WWTP.
Wastewater Treatment	Primary Clarifier	Truck (bulk)	Calcium Nitrate	Area is contained. Stormwater is pumped to WWTP.
Wastewater Treatment	Sludge Press	Truck (bulk)	Polymer	Concrete pad drains to process sewer and WWTP.

Table 3-2 Outside Storage Tanks

Process Area	Tank	Contents	Volume Gallons	Containment Drainage
Pulp Mill	Propane	Liquified Propane	1000 ea (2 tanks)	NA
Medium Mill	Felt Cleaner	Presstige	6,400	Concrete containment pad. Area drains to process sewer & WWTP
Medium Mill	High Density (HD) Pulp Tank	Paper Stock	581,668	Concrete containment pad. Area drains to process sewer & WWTP
Medium Mill	Sweco	Paper Stock		Area drains to process sewer and WWTP
Medium Mill	Warm Water	Warm Water		Area drains to process sewer and WWTP
Medium Mill	Used Oil	Used Oil	1,000	Tank is contained
Water Treatment	Alum Tank	48.5% Alum	8,000	Tank is contained
Water Treatment	Boiler Condensate	Boiler Condensate	15,040	Area drains to process sewer and WWTP
Water Treatment	Salt Tank	Salt	8,500	Area drains to process sewer and WWTP
Water Treatment	Caustic Tank	Sodium hydroxide	7,530	Area drains to process sewer and WWTP
Recovery	Kerosene Tank	Kerosene	300	Area drains to process sewer and WWTP
Recovery	Sodium Carbonate (3)	Sodim Carbonate	39,657 ea	Area drains to process sewer and WWTP
Recovery	Strong Black Liquor	Strong black liquor	100,000	Area drains to process sewer and WWTP
Recovery	Green Liquor	Green Liquor	150,000	Area drains to process sewer and WWTP
Recovery	Swing Tank	Weak black liquor or green liquor	150,000	Area drains to process sewer and WWTP
Recovery	Surge Tank	Weak black liquor	16,919	Area drains to process sewer and WWTP
Recovery	Rec. Boiler Area Tanks (4)	Black liquor or green liquor	6,750 to 90,000	Area drains to process sewer and WWTP
Recovery	Finished Liquor Tank	White liquor	174,000	Area drains to process sewer and WWTP
Power House	Diesel fuel day tank	Diesel fuel	1,000	Tank is contained
Woodyard	Diesel fuel tank	Diesel fuel	4,000	Double walled tank with curbing
Woodyard	Gasoline Tank	Gasoline	1,000	Double walled tank with curbing
Linerboard Mill	Dump Chest	Paper Stock	177,732	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Caustic Tank	Sodim hydroxide	13,535	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Alum Tank	Alum 48.5%	13,535	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Size	Chemical Additive	6,400	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Defoamer	Defoamer	5,500	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Broke	Paper Stock	155,600	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	High Density (HD) Pulp Tank	Paper Stock	667,071	Tank is loacted within concrete containment. Area drains to WWTP

Table 3-2 Outside Storage Tanks

Process Area	Tank	Contents	Volume Gallons	Containment Drainage
Linerboard Mill	Low Density storage chest	Paper Stock	45,494	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Whitewater	Dilute stock solution	154,171	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Propane (2)	Liquified Propane	1,000 ea	N/A
Linerboard Mill	Kerosene Tank	Kerosene	250	Tank is contained and area drains to stormwater sewer
Linerboard Mill	Starch Silo	Starch		Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Size	Chemical Additive	10000	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Hercobond Tank	Chemical Additive	6400	Tank is loacted within concrete containment. Area drains to WWTP
Linerboard Mill	Fire Tank	Mill Water		Area drains to stormwater sewer
Tank Farm	Weak Black Liquor	weak black Liquor	588,000	Tank is located within an earthern berm
Tank Farm	Weak Black Liquor (2)	Weak black liquor	900,000	Tank is located within an earthern berm
Tank Farm	Diesel fuel storage tank	Diesel fuel	125,000	Tank is located within an earthern berm
WWTP	Nutrient	Urea-phosphoric Acid	6,000	Tank is located within concrete containment.
WWTP	Primary Clarifier	Industrial Wastewater	853,000	Area drains to stormwater sewer
WWTP	Calcium Nitrate Tank	Calcium Nitrate	5,000	Tank is located within containment
WWTP	Propane Tank	Liquified propane	500	N/A
WWTP	Secondary Clarifier	Industrial Wastewater	1,700,000	Area drains to WWTP and stormwater
WWTP	Sludge Tanks (2)	Industrial Wastewater Sludge	100,000 ea	Tank equipped with high level interlocks. Area drains to stormwater
WWTP	Lime Silo	Quicklime	50 tons	Tank equipped with high level interlocks. Area drains to WWTP
Amherst Landfill	Diesel Truck	Diesel fuel	2000	Truck is located within a lined earthern berm

Stormwater Drainage for PCB Monitoring.xls

OUTFALL	COMMENTS	Recommend Sampling for PCB?
005	This outfall drains a limited area around the mill water clarifier and under the truck ramp. There are no known potential sources of PCBs in this drainage area.	no
007	This outfall drains roadway, parking areas and any overflows from the main lift station. There are no known sources of PCBs in the drainage area.	no
009	This outfall drains roadway, parking areas and any overflows from the main lift station. There was a pole-mounted transformer within the drainage area for this outfall, however, it was removed from the site 2-3 years ago. There are no known potential sources of PCBs in this drainage area.	no
010	This outfall drains roadway and parking areas only with no known sources of PCBs.	no
012	This outfall drains OCC storage, roadway and parking areas, however there is a non-PCB containing pole mounted transformer within the drainage area for this outfall so this outfall is included in our recommendation.	yes
013	This outfall drains roadway and parking areas only with no known sources of PCBs.	no
014	This outfall drains roadway and parking areas only with no known sources of PCBs.	no
015	There are non-PCB containing transformers in drainage area for this outfall.	yes
017	There are non-PCB containing transformers in drainage area for this outfall.	yes
018	This outfall drains roadway areas only with no known sources of PCBs.	no
021	This outfall drains the DLK unloading and storage area only with no known potential PCBs.	no
022	N/A - located in Amherst County (landfill only)	no
023	N/A - located in Amherst County (landfill only)	no
025	N/A - located in Amherst County (landfill only)	no
026	N/A - (Bedford County Landfill only at this location)	no
028	N/A - located in Amherst County (landfill only)	no

The areas listed above have been evaluated for the presence of hydraulic units, used oil and lubricants per the documentation from Oregon DEQ provided to us for reference by Virginia DEQ. The areas where hydraulic units, used oil and lubricants are present drain to the process sewer and ultimately discharge through Outfall 003.

To my knowledge, used oil has not been used for dust suppression at the Mill and the Mill does not utilize any heat transfer or lubrication products known to contain PCBs.

PCBs were primarily present in carbonless paper which has never been produced by the Mill. Most of the PCB sources of carbonless paper essentially were no longer used after 1990. The Big Island mill began recycling OCC during 1995, and has never recycled sources of carbonless paper. OCC is a completely different recycle stream from carbonless paper and does not include PCBs.

Attachment D

Ambient Water Quality Evaluations

- **2008 Impaired Waters Summary (Excerpt)**
- **2004 Use Attainment Summary (Excerpt)**
- **Upper James River Water Quality Management Plan (Excerpt)**
- **VDH Memorandums Regarding *Klebsiella Pneumoniae***
- **Endangered Species Information**

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

2008 Impaired Waters

Categories 4 and 5 by DCR Watershed*

James River Basin

Fact Sheet prepared for DCR Watershed: H01*

Cause Group Code: **H03R-04-PCB** **James River**

Location: James River mainstem from the mouth of Hunting Creek downstream to Holcomb Rock Dam.

City / County: Amherst Co. Bedford Co.

Use(s): Fish Consumption

Cause(s) /
VA Category: PCB in Fish Tissue/ 5A

VDH Fish Advisory Information - Effective 12/13/04: James River mainstem from Big Island dam downstream to the I-95 Bridge in Richmond (173.75 miles) to include a portion of the Hardware (23.11 miles) and Slate Rivers (3.88 miles) for a total of 200.74 miles. The advisory recommends that no more than two meals/month of the following species be consumed:
Gizzard Shad
Carp
American Eel
Flathead Catfish
Quillback Carpsucker
Visit the VDH website for more details: http://www.vdh.state.va.us/HHControl/fishingadvisories.asp.

Assessment Unit / Water Name / Description	Cause Category	Name	Cycle First Listed	TMDL Schedule	Size
VAW-H01R_JMS01A00 / James River Holcomb / James River mainstem from the mouth of Wilderness Creek downstream to Holcomb Rock Dam.	5A	PCB in Fish Tissue	2006	2016	1.34
VAW-H01R_JMS01A04 / James River Upper PWS / The James River from the upstream ending of the WQS PWS designation (37°30'08.38"/79°01'18.18") downstream to the mouth of Wilderness Creek.	5A	PCB in Fish Tissue	2006	2016	0.71
VAW-H01R_JMS02A00 / James River Lower / James River mainstem from the Georgia Pacific outfalls downstream to the upstream ending of the WQS PWS designation (37°30'08.38"/79°01'18.18")	5A	PCB in Fish Tissue	2006	2016	4.03
VAW-H01R_JMS03A00 / James River Middle 1 / James River mainstem from the mouth of Hunting Creek downstream to the Georgia Pacific outfalls on the James River.	5A	PCB in Fish Tissue	2006	2016	0.28

James River **DCR Watershed: H01***	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
PCB in Fish Tissue - Total Impaired Size by Water Type:			**6.36**

Sources:

Source Unknown

*Header Information: Location, City/County, Cause/VA Category and Narratives; describe the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

2008 Impaired Waters

Categories 4 and 5 by DCR Watershed*

James River Basin

Fact Sheet prepared for DCR Watershed: H01*

Cause Group Code: **H01R-01-BAC** **Reed Creek**

Location: The upper limit is the headwaters in the Jefferson National Forest on the Sedalia Quad (intersection of State Routes 638 and 764). The impairment ends at the mouth of Reed Creek on the James River below Big Island, Virginia (Snowden, Sedalia and Big Island Quads).

City / County: Bedford Co.

Use(s): Recreation

Cause(s) /
VA Category: Escherichia coli/ 4A

The Reed Creek Bacteria TMDL Load Duration Study received US EPA approval on 6/21/2004 [Fed. ID. 7763 / 21565] and SWCB approval on 12/02/2004 for these 1998 303(d) Listed waters (formerly 2002 thru 2006 VAW-H01R-01). Three stations are located within the 8.37 mile impaired waters (NHD mileage correction from 2002 Listing 12.27 miles). 2-RED000.16 (Off Route 501), the original listing station, and two additional stations 2-RED005.36 (Route 637 Bridge) and 2-RED008.32 (Route 122 Bridge). Escherichia coli (E.coli) replaces fecal coliform bacteria as the indicator with sufficient E.coli data as per Water Quality Standards [9 VAC 25-260-170. Bacteria; other waters].

2-RED008.22- (Rt. 122 Bridge) Five of 17 E.coli samples exceed the 235 cfu/100 ml WQS instantaneous criterion. Values in excess of the criterion range from 350 to 1300 cfu/100 ml.

2-RED005.36- (Rt. 637 Bridge) E.coli exceedences of the instantaneous criterion are found in 12 of 17 samples where exceeding values range from 280 to 2000 cfu/100 ml.

2-RED000.16- (Off Rt. 501) Eight of 38 E.coli samples exceed the 235 cfu/100 ml WQS instantaneous criterion. Values in excess of the criterion range from 250 to 500 cfu/100 ml. Three of five GM calculations exceed the WQS 126 cfu/100 ml criterion.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-H01R_RED01A00 / Reed Creek Lower / Reed Creek mainstem from its mouth on the James River upstream to the intersection of State Routes 638 and 764.	4A Escherichia coli	2004	2004	8.37

Reed Creek DCR Watershed: H01*	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Escherichia coli - Total Impaired Size by Water Type:			**8.37**

Sources:

- Livestock (Grazing or Feeding Operations)
- On-site Treatment Systems (Septic Systems and Similar Decencentralized Systems)
- Unspecified Domestic Waste
- Wastes from Pets
- Wildlife Other than Waterfowl

*Header Information: Location, City/County, Cause/VA Category and Narratives; describe the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

2004 Use Attainment by Assessment Units (AU)

Watershed ID: VAW-H01R

Total Watershed Size: 178.68 M

AU ID: **VAW-H01R_TRR01A02** **2.22** M ***AU Overall Category:*** **3A**

LOCATION: Terrapin Creek from its confluence with Otter Creek upstream to its headwaters.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Not Assessed	
	Fish Consumption	Not Assessed	
	Recreation	Not Assessed	
	Wildlife	Not Assessed	

WQS Class V Sec. 11j None No current data. These waters are unassessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_SNO02A02** **2.61** M ***AU Overall Category:*** **2A**

LOCATION: Snow Creek mainstem from its headwaters downstream to the Snow Creek Recreational Area.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Fully Supporting	
	Fish Consumption	Not Assessed	
	Recreation	Not Assessed	
	Wildlife	Not Assessed	

WQS Class III Sec. 11j None
Assessment Basis: DEQ station 2-SNO000.35 (RBPII). 2-SNO000.35- Bio NI; This site was surveyed as part of a study to determine if a U.S. Forest Service stream designated as a "Water of Concern" in the 2002 Cycle when utilizing DEQ methods. The survey results indicate a benthic community more diverse than when the USFS sampled in May 1996. There were also more sensitive taxa present in 2002. This site was compared to another USFS stream in the Blue Ridge Ecoregion, the North Fork of Buffalo River in Amherst County (sample from spring 2001). Snow Creek rated as non-impaired when applying the RBPII metrics as well as MAIS and the Virginia Stream Condition Index. No VDH fish consumption advisory.

AU ID: **VAW-H01R_SNO01A02** **0.46** M ***AU Overall Category:*** **2A**

LOCATION: Snow Creek mainstem from the Snow Creek Recreational Area downstream to its mouth on the James River.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Fully Supporting	
	Fish Consumption	Not Assessed	
	Recreation	Not Assessed	
	Wildlife	Not Assessed	

WQS Class III Sec. 11j None
Assessment Basis: DEQ station 2-SNO000.35 (RBPII). 2-SNO000.35- Bio NI; This site was surveyed as part of a study to determine if a U.S. Forest Service stream designated as a "Water of Concern" in the 2002 Cycle when utilizing DEQ methods. The survey results indicate a benthic community more diverse than when the USFS sampled in May 1996. There were also more sensitive taxa present in 2002. This site was compared to another USFS stream in the Blue Ridge Ecoregion, the North Fork of Buffalo River in Amherst County (sample from spring 2001). Snow Creek rated as non-impaired when applying the RBPII metrics as well as MAIS and the Virginia Stream Condition Index. No VDH fish consumption advisory.

AU ID: **VAW-H01R_RRW01A02** **3.99** M ***AU Overall Category:*** **3A**

LOCATION: Rocky Row Run mainstem from its confluence with the James River upstream to its headwaters.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Not Assessed	
	Fish Consumption	Not Assessed	

State TMDL ID	Use	WQS Attainment		303(d) Impairment Initial List Year
	Recreation	**Not Assessed**		
	Wildlife	**Not Assessed**		

WQS Class V Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_RED02A02** **2.56** M ***AU Overall Category:*** **3A**

LOCATION: Reed Creek mainstem and tributaries from the intersection of State Routes 638 and 764 upstream to its headwaters.

State TMDL ID	*Use*	*WQS Attainment*		*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**		
	Fish Consumption	**Not Assessed**		
	Recreation	**Not Assessed**		
	Wildlife	**Not Assessed**		

WQS Class VI Sec. 11 None No current data. These waters are not assessed. Currently no NHD trace of these waters. No VDH fish consumption advisory.

AU ID: **VAW-H01R_RED01A00** **12.27** M ***AU Overall Category:*** **5A**

LOCATION: Reed Creek mainstem from its mouth on the James River upstream to the intersection of State Routes 638 and 764.

State TMDL ID	*Use*	*WQS Attainment*		*303(d) Impairment Initial List Year*
	Aquatic Life	**Fully Supporting**		
	Fish Consumption	**Not Assessed**		
VAW-H01R-01	**Recreation**	**Not Supporting**		
	303(d) Parameter:	**Total Fecal Coliform**		1996
		Escherichia coli		2004
	Wildlife	**Fully Supporting**		

WQS Class III Sec. 11 None
Assessment basis: DEQ stations 2-RED000.16 (AQ), 2-RED005.36 (TM) and 2-RED008.22 (TM) Stream Flow Conditions [9 VAC 25-260-50 Numerical criteria for dissolved oxygen, pH and maximum temperature***]. Total field measurements 20 at 2-RED000.16 with three each at 2-RED005.36 and 2-RED008.22. Daily Mean Flow; 02018500 Catawba Creek - Catawba <7Q10 of 1.8 cfs @ gage on 8/29/02 (1.3 cfs). Also Daily Mean Flow; 0202550 James River - Holcombs Rock <7Q10 of 554 cfs on 8/29/02 (440 cfs). One Fully Supporting field measurement set excluded from the dataset for each station. 2-RED000.16- FC exceeds the WQS instantaneous criterion of 400 n/100 ml in eight of 19 observations with exceeding values ranging from 500 to 3600 cfu/100 ml. One of three Escherichia coli (E. coli) observations exceed the WQS criterion of 235 cfu/100 ml; the exceedance is 300 cfu/100 ml- insufficient to assess. Sediment, DO, Temp, pH, TP, water column metals and organics all Fully Support. 2-RED005.36- FC exceeds the 400 n/100 ml instantaneous criterion in three of three observations. FC exceeding values range from 490 to 1700 cfu/100 ml. Two of three E. coli observations exceed the 235 cfu/100 ml criterion; ranging from 150 to 800+ cfu/100 ml; 12 samples required as per WQS [9 VAC 25-260-170.A.1. Bacteria; other waters] to replace FC. DO, Temp, pH, TP and NH3-N each Fully Support. 2-RED008.22- FC exceeds the 400 cfu/100 ml instantaneous criterion in one of three observations. FC ranges from 20 to 790 cfu/100 ml. One of three E. coli observations exceed the 235 cfu/100 ml criterion with a range of 10 to 800 cfu/100 ml; Both collections are insufficient to assess. DO, Temp, pH, TP and NH3-N each Fully Support. No VDH fish consumption advisory.

AU ID: **VAW-H01R_PRC02A02** **3.77** M ***AU Overall Category:*** **3A**

LOCATION: Peters Creek mainstem and tributaries from 0.20 miles upstream of its confluence with the James River on upstream to its headwaters.

State TMDL ID	*Use*	*WQS Attainment*		*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**		
	Fish Consumption	**Not Assessed**		
	Recreation	**Not Assessed**		
	Wildlife	**Not Assessed**		

WQS Class VI Sec. 11j None No current data. These waters are not assessed. 2002 Cycle US Forest Service benthic surveys conducted outside the 2004 Assessment data window at 5546 (MAIS 17 VG) found no impairment. No VDH fish consumption advisory.

2004 Use Attainment by Assessment Units (AU)

AU ID: **VAW-H01R_PRC01A02** **0.20** M ***AU Overall Category:*** **3A**

LOCATION: Peters Creek mainstem and tributaries from its confluence with the James River 0.20 miles upstream.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class III Sec. 11j None No current data. These waters are not assessed. 2002 Cycle US Forest Service benthic surveys conducted outside the 2004 Assessment data window at 5546 (MAIS 17 VG) found no impairment. No VDH fish consumption advisory.

AU ID: **VAW-H01R_OTR02A02** **7.69** M ***AU Overall Category:*** **3A**

LOCATION: Otter Creek mainstem and tributaries from 4.90 miles upstream of its mouth on the James River on upstream to its headwaters.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class V Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_OTR01A02** **4.90** M ***AU Overall Category:*** **3A**

LOCATION: Otter Creek mainstem from its confluence with the James River upstream 4.90 miles.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class V Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_MTT01A02** **2.98** M ***AU Overall Category:*** **2B**

LOCATION: Matts Creek mainstem and tributaries from its confluence with the James River upstream to its headwaters.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Fully Supporting**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class III Sec. 11j None
Assessment basis: USFS MAIS station 5525. 5525- Bio SI - Fully Supporting w/Slight Impairment; two surveys '99 (MAIS 16 Good); '98 (MAIS 16 Good). No VDH fish consumption advisory.

2004 Use Attainment by Assessment Units (AU)

AU ID: **VAW-H01R_JMS30A00** **76.43** M ***AU Overall Category:*** **3A**

LOCATION: Tributaries to the James River downstream of the Georgia Pacific intake on the James River.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Public Water Supply	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class III Sec. 11 None No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_JMS20A00** **20.50** M ***AU Overall Category:*** **3A**

LOCATION: Tributary streams to the James River upstream of the Georgia Pacific intake on the James River.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class III Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_JMS04A00** **9.22** M ***AU Overall Category:*** **2A**

LOCATION: James River mainstem from the Balcony Falls Dam downstream to the mouth of Hunting Creek.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Fully Supporting**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Fully Supporting**	
	Wildlife	**Fully Supporting**	

WQS Class III Sec. 11j None
Assessment basis: DEQ station 2-JMS282.28 (AQ). Stream Flow Conditions: Total field measurements 59. Daily Mean Flow; 0202550 James River - Holcombs Rock <7Q10 of 554 cfs on 8/29/02 (440 cfs). One Fully Supporting field measurement set excluded from the dataset. 2-JMS282.28- FC 6 observations exceed the 400 n/100 ml WQS criterion from 58 samples. FC values range from <100 to 8000+ n/100 ml. Full Support is found for Sediment, DO, Temp, pH, TP, chlorophyll a, NH3-N and chlorides. No VDH fish consumption advisory.

AU ID: **VAW-H01R_JMS03A00** **0.29** M ***AU Overall Category:*** **2A**

LOCATION: James River mainstem from the mouth of Hunting Creek downstream to the Georgia Pacific outfalls on the James River.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Fully Supporting**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Fully Supporting**	
	Wildlife	**Fully Supporting**	

2004 Use Attainment by Assessment Units (AU)

WQS Class III Sec. 11 None
Assessment basis: DEQ station 2-JMS282.28 (AQ). The Assessment Unit was 303(d) De-listed in 2002 for the 1998 303(d) FC bacteria listing . Initially 303(d) listed in 1996 for fecal coliform bacteria. Stream Flow Conditions [9 VAC 25-260-50 Numerical criteria for dissolved oxygen, pH and maximum temperature***]. Total field measurements 59. Daily Mean Flow; 0202550 James River - Holcombs Rock <7Q10 of 554 cfs on 8/29/02 (440 cfs). One Fully Supporting field measurement set excluded from the dataset. 2-JMS282.28- FC six observations exceed the 400 n/100 ml WQS criterion from 58 samples. FC values range from <100 to 8000+ n/100 ml. Full Support is found for Sediment, DO, Temp, pH, TP, chlorophyll a, NH3-N/Full Support . No VDH fish consumption advisory.

AU ID: **VAW-H01R_JMS02A00** **4.02** M ***AU Overall Category:*** **2B**

LOCATION: James River mainstem from the Georgia Pacific outfalls downstream to the upstream ending of the WQS PWS designation (37°30'08.38"/79°01'18.18").

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Fully Supporting	
	Fish Consumption	Not Assessed	
	Recreation	Fully Supporting	
	Wildlife	Fully Supporting	

WQS Class III Sec. 11 None
Assessment basis: DEQ station 2-JMS275.75 (AQ). The segment was 303(d) De-listed in 2002 for the 1998 303(d) FC bacteria listing . Initial 303(d) listed in 1996 for fecal coliform bacteria. Stream Flow Conditions [9 VAC 25-260-50 Numerical criteria for dissolved oxygen, pH and maximum temperature***]. Total field measurements 59. Daily Mean Flow; 0202550 James River - Holcombs Rock <7Q10 of 554 cfs on 8/29/02 (440 cfs). One Fully Supporting field measurement set excluded from the dataset. 2-JMS275.75- FC six observations exceed the 400 n/100 ml WQS criterion from 58 samples. FC ranges from <100 to 4500 n/100 ml. Ten of 56 TP observations exceed the 0.20 mg/l TP SV - 'Observed Effect'. TP ranges from 0.03 to 0.30 mg/l. Full Support found for Sed, DO, Temp, pH, chlorophyll a , NH3-N /Full Support. No VDH fish consumption advisory.

AU ID: **VAW-H01R_JMS01A04** **0.72** M ***AU Overall Category:*** **2B**

LOCATION: The James River from the upstream ending of the WQS PWS designation (37°30'08.38"/79°01'18.18") downstream to the mouth of Wilderness Creek.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Fully Supporting	
	Fish Consumption	Not Assessed	
	Public Water Supply	Fully Supporting	
	Recreation	Fully Supporting	
	Wildlife	Fully Supporting	

WQS Class III Sec. 11h PWS
Assessment basis: DEQ station 2-JMS275.75 (AQ). The segment was 303(d) De-listed in 2002 for the 1998 303(d) FC bacteria listing . Initial 303(d) listed in 1996 for fecal coliform bacteria. Stream Flow Conditions [9 VAC 25-260-50 Numerical criteria for dissolved oxygen, pH and maximum temperature***]. Total field measurements 59. Daily Mean Flow; 0202550 James River - Holcombs Rock <7Q10 of 554 cfs on 8/29/02 (440 cfs). One Fully Supporting field measurement set excluded from the dataset. 2-JMS275.75- FC six observations exceed the 400 n/100 ml WQS criterion from 58 samples. FC ranges from <100 to 4500 n/100 ml. Ten of 56 TP observations exceed the 0.20 mg/l TP SV - 'Observed Effect'. TP ranges from 0.03 to 0.30 mg/l. Full Support found for Sed, DO, Temp, pH, chlorophyll a , NH3-N/Full Support. No VDH fish consumption advisory.

AU ID: **VAW-H01R_JMS01A00** **1.34** M ***AU Overall Category:*** **3A**

LOCATION: James River mainstem from the mouth of Wilderness Creek downstream to Holcomb Rock Dam.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Not Assessed	
	Fish Consumption	Not Assessed	
	Public Water Supply	Not Assessed	
	Recreation	Not Assessed	
	Wildlife	Not Assessed	

WQS Class III Sec. 11 None No current data. These waters are not assessed. No VDH fish consumption advisory.

2004 Use Attainment by Assessment Units (AU)

AU ID: **VAW-H01R_HUO02A02** **4.82** M ***AU Overall Category:*** **3A**

LOCATION: Hunting Creek mainstem and tributaries from 3.7 miles upstream of the Hunting Creek mouth on the James River on upstream to its headwaters.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class VI Sec. 11j None
No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_HUO01A00** **3.70** M ***AU Overall Category:*** **3A**

LOCATION: Hunting Creek mainstem from its mouth on the James River upstream 3.7 miles.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class III Sec. 11j None
No current data. These waters are not assessed. However no impairments were found in the 2002 Cycle Assessment from DEQ station 2-HUO000.40 (AQ). This station was discontinued 6/96. No VDH fish consumption advisory.

AU ID: **VAW-H01R_FRC01A02** **1.52** M ***AU Overall Category:*** **3A**

LOCATION: Falling Rock Creek mainstem and tributaries from its confluence with Peters Creek upstream to its headwaters.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class VI Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_CSW01A02** **2.71** M ***AU Overall Category:*** **3A**

LOCATION: Cashaw Creek mainstem from its confluence with the James River upstream to its headwaters.

State TMDL ID	*Use*	*WOS Attainment*	*303(d) Impairment Initial List Year*
	Aquatic Life	**Not Assessed**	
	Fish Consumption	**Not Assessed**	
	Recreation	**Not Assessed**	
	Wildlife	**Not Assessed**	

WQS Class V Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

2004 Use Attainment by Assessment Units (AU)

AU ID: **VAW-H01R_BYB01A02** **2.45** M *AU Overall Category:* **3A**

LOCATION: Billys Branch mainstem and tributaries from its confluence with Peters Creek upstream to its headwaters.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Not Assessed	
	Fish Consumption	Not Assessed	
	Recreation	Not Assessed	
	Wildlife	Not Assessed	

WQS Class V Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_BLE01A02** **1.94** M *AU Overall Category:* **3A**

LOCATION: Bellamy Creek mainstem and tributaries from its confluence with Battery Creek upstream to its headwaters.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Not Assessed	
	Fish Consumption	Not Assessed	
	Recreation	Not Assessed	
	Wildlife	Not Assessed	

WQS Class III Sec. 11j None No current data. These waters are not assessed. However US Forest Service benthic surveys conducted outside the 2004 Assessment data window at 5548 (MAIS Scores) found no impairment.

No VDH fish consumption advisory.

AU ID: **VAW-H01R_BAT02A02** **3.07** M *AU Overall Category:* **3A**

LOCATION: Battery Creek mainstem from its headwaters downstream to the confluence of Bellamy Creek.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Not Assessed	
	Fish Consumption	Not Assessed	
	Recreation	Not Assessed	
	Wildlife	Not Assessed	

WQS Class V Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

AU ID: **VAW-H01R_BAT01A02** **2.30** M *AU Overall Category:* **3A**

LOCATION: Battery Creek mainstem from the confluence of Bellamy Creek downstream to its mouth on the James River.

State TMDL ID	Use	WQS Attainment	303(d) Impairment Initial List Year
	Aquatic Life	Not Assessed	
	Fish Consumption	Not Assessed	
	Recreation	Not Assessed	
	Wildlife	Not Assessed	

WQS Class V Sec. 11j None No current data. These waters are not assessed. No VDH fish consumption advisory.

9 VAC 25-720-60. James River Basin.

A. Total maximum daily load (TMDLs).

TMDL #	Stream Name	TMDL Title	City/ County	WBID	Pollutant	WLA	Units
1.	Pheasanty Run	Benthic TMDL Reports for Six Impaired Stream Segments in the Potomac-Shenandoah and James River Basins	Bath	I14R	Organic Solids	1,231.00	LB/YR
2.	Wallace Mill Stream	Benthic TMDL Reports for Six Impaired Stream Segments in the Potomac-Shenandoah and James River Basins	Augusta	I32R	Organic Solids	2,814.00	LB/YR
3.	Montebello Sp. Branch	Benthic TMDL Reports for Six Impaired Stream Segments in the Potomac-Shenandoah and James River Basins	Nelson	H09R	Organic Solids	37.00	LB/YR
4.	Unnamed Tributary to Deep Creek	General Standard Total Maximum Daily Load For Unnamed Tributary to Deep Creek	Nottoway	J11R	Raw Sewage	0	GAL/YR
5.	Unnamed Tributary to Chickahominy River	Total Maxiumum Daily Load (TMDL) Development for the Unnamed Tributary to the Chickahominy River	Hanover	G05R	Total Phosphorus	409.35	LB/YR

B. Stream segment classifications, effluent limitations including water quality based effluent limitations, and waste load allocations.

TABLE B1 - UPPER JAMES RIVER BASIN RECOMMENDED SEGMENT CLASSIFICATION

Stream Name	Segment No.	Mile to Mile	Classification	Comments
Maury River	2-4	80.3-0.0	E.L.	Main & tributaries
James River	2-5	271.5-266.0	W.Q.	Main only
James River	2-6	266.0-115.0	E.L.	Main & tributaries except Tye & Rivanna River
Tye River	2-7	41.7-0.0	E.L.	Main & tributaries except Rutledge Creek
Rutledge Creek	2-8	3.0-0.0	W.Q.	Main only
Piney River	2-9	20.6-0.0	E.L.	Main & tributaries
Rivanna River	2-10	20.0-0.0	E.L.	Main & tributaries
Rivanna River	2-11	38.1-20.0	W.Q.	Main only
Rivanna River	2-12	76.7-38.1	E.L.	Main & tributaries
S.F. Rivanna River	2-13	12.2-0.0	E.L.	Main & tributaries
Mechum River	2-14	23.1-0.0	E.L.	Main & tributaries
N.F. Rivanna River	2-15	17.0-0.0	E.L.	Main & tributaries except Standardsville Run
Standardsville Run	2-16	1.2-0.0	W.Q.	Main only
Appomattox River	2-17	156.2-27.7	E.L.	Main & tributaries except Buffalo Creek, Courthouse Branch, and Deep Creek
Buffalo Creek	2-18	20.9-0.0	E.L.	Main & tributaries except Unnamed Tributary @ R.M. 9.3
Unnamed Tributary of Buffalo Creek @ R.M. 9.3	2-19	1.3-0.0	W.Q.	Main only
Courthouse Branch	2-20	0.6-0.0	W.Q.	Main only
Deep Creek	2-21	29.5-0.0	E.L.	Main & tributaries except Unnamed Tributary @ R.M. 25.0
Unnamed Tributary of Deep Creek @ R.M. 25.0	2-22	2.2-0.0	W.Q.	Main only

TABLE B2 - UPPER JAMES RIVER BASIN LOAD ALLOCATIONS BASED ON EXISTING DISCHARGE POINT7

Stream Name	Segment Number	Classification	Mile to Mile	Significant Discharges	Total Assimilative Capacity of Stream BOD5 lbs/day	Wasteload Allocation BOD5 lbs/day2	Reserve BOD5 lbs/day5
Cedar Creek	2-3	E.L.	1.9-0.0	Natural Bridge, Inc. STP	35.0	28.0	7.0 (20%)
Elk Creek	2-3	E.L.	2.8-0.0	Natural Bridge Camp for Boys STP	7.0	3.3	3.7 (53%)
Little Calfpasture River	2-4	E.L.	10.9-4.0	Craigsville	12.0	9.6	2.4 (20%)
Cabin River	2-4	E.L.	1.7-0.0	Millboro	Self -sustaining	None	None
Maury River	2-4	E.L.	19.6-12.2	Lexington STP	380.0	380.0	None
Maury River	2-4	E.L.	12.2-1.2	Georgia Bonded Fibers	760.0	102.03	238.0 (31%)
				Buena Vista STP		420.0	
Maury River	2-4	E.L.	1.2-0.0	Lees Carpets	790.0	425.03	290.0 (37%)
				Glasgow STP		75.0	
James River	2-5	W.Q.	271.5-266.0	~~Owens-Illinois~~ GP Big Island	4,640.0	4,640.03	None
James River	2-6	E.L.	257.5-231.0	Lynchburg STP	10,100.0	8,000.0	2,060.0 (20%)
				Babcock & Wilcox- NNFD		40.03	
James River	2-6	E.L.	231.0-202.0	Virginia Fibre	3,500.0	3,500.0	None
Rutledge Creek	2-8	W.Q.	3.0-0.0	Amherst STP	46.0	37.0	9.0 (20%)
Town Creek	2-7	E.L.	2.1-0.0	Lovington STP	26.0	21.0	5.0 (20%)
Ivy Creek	2-6	E.L.	0.1-0.0	Schuyler	13.8	11.0	2.8 (20%)
James River	2-6	E.L.	186.0-179.0	Uniroyal, Inc.	1,400.0	19.36	1,336.0 (95%)
				Scottsville STP		45.0	
North Creek	2-6	E.L.	3.1-0.0	Fork Union STP	31.0	25.0	6.0 (20%)
Howells Branch and Licking Hole Creek	2-14	E.L.	0.7-0.0	Morton Frozen Foods	20.0	20.03	None
Standardsville Run	2-16	W.Q.	1.2-0.0	Standardsville STP	17.9	14.3	3.6 (20%)
Rivanna River	2-11	W.Q.	23.5-20.0	Lake Monticello STP	480.0	380.0	100.0 (20%)
Rivanna River	2-10	E.L.	15.0-0.0	Palmyra	250.0	4.0	158.0 (63%)

F. ASSIGNMENT OF EFFLUENT LIMITS TO ALL SIGNIFICANT POINT SOURCES AND ESTABLISHMENT OF COMPLIANCE SCHEDULES AND TARGET ABATEMENT DATES

This section lists the maximum allowable loads for individual significant dischargers. Two tables are used to present these values. Table 76, "Load Allocations Based on Existing Discharge Point," lists the waste load allocations determined for dischargers based on the criteria that the existing discharge point is used or, if there is currently no treatment facility, the stream presently receiving the runoff is used. During the development of alternative treatment systems and the subsequent selection of the recommended plan, the point of discharge is recommended for relocation or elimination (in the case of land application of secondary effluent) in several cases. Table 77, "Additional Load Allocations Based on Recommended Discharge Point," lists the cases where this occurs.

The tables provide a list of the significant dischargers which primarily discharge biochemical oxygen demanding substances. The total assimilative capacity of the stream segment is shown in terms of five-day biochemical oxygen demand (BOD_5). The receiving stream, its recommended segment classification and number, and the stream limits for which the total assimilative capacity is valid are shown in the tables. Another important item in the table is the waste load allocations for a given significant discharger. This allocation is based either on 80 percent of the total assimilative capacity of the stream or on the year 2020 projected BOD_5 load, whichever is less. The reserve column of the tables indicate the amount of BOD_5 load that is being held in reserve to allow for future growth and modeling accuracy. The percentages of reserve noted are based on the total assimilative capacity of the stream and readily indicate if the full load allocation of a segment is being allotted to the significant discharger. This occurs when the reserve is equal to 20 percent.

Although noted elsewhere in this study, the criteria used in determining the total assimilative capacity (maximum allowable load) of a stream will be repeated here for completeness. For Water Quality (W.Q.) segments, the criteria of minimum daily average dissolved oxygen content, as given in the Water Quality Standards for a given class stream, is used. The criteria of the SWCB's policy of maintenance of high water quality is used in determining the total assimilative capacity for Effluent Limitation (E.L.) segments.

The establishment of compliance schedules and target abatement dates for significant municipal point sources is contained in Chapter VI, Section B of this study. To prevent repetition within the study, they are not included in this section.

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November 18, 1992

Mr. Garry T. Griffith
Environmental & Quality Control Supt.
Georgia–Pacific Corporation
P.O. Box 40
Big Island, VA 24526

Re: Report for Proposal #93-0131-07
Sponsor PO # 043012
FRS # 435156

Dear Garry:

This letter accompanies our final report which is dated 6 November 1992. The final report contains five pages of text, one figure, and five tables. Accompanying this final report is a notebook that contains nine tabbed sections; each section contains all data in table form that was submitted to you as part of the 10 interim reports sent to you during the project period.

Please let me know if you wish for us to add anything to the text of this report or if you wish to discuss any of the points made in our report.

We have enjoyed working with you and Marina on this project. Thank you for your support and kind assistance.

Sincerely,

Bill

G. William Claus, Ph.D.
Associate Professor of
Microbiology

enclosures

Copy sent to: B. Slagle
Va Fibre 3/94

REPORT

1992 BACTERIOLOGICAL INVESTIGATION OF JAMES RIVER SAMPLES TAKEN UPSTREAM, AT THE WASTE-TREATMENT OUTFALL, AND DOWNSTREAM FROM THE GEORGIA-PACIFIC CORPORATION BIG ISLAND MILL

G. William Claus and Joy Grant
Biology Department, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0406

6 November 1992

INTRODUCTION

The purpose of this study was to provide Georgia-Pacific Corporation with a bacteriological analysis of waste-water flowing from their treatment system into the James River and to compare that with similar bacteriological analyses of river water obtained from above and below the waste-water outfall.

METHODS

Sampling sites: Water samples were taken from three sampling sites: (1) in the James River upstream from the Georgia-Pacific Mill (at Big Island Dam); (2) at the outfall (003) from the Georgia-Pacific Corporation Big-Island Paper Mill waste-water treatment system; and (3) in the James River about five-miles downstream from the 003 waste-stream outfall (at Coleman Falls Dam).

Number and frequency of sampling: Duplicate samples were taken at each sampling site on 10 separate dates between 3 March 1992 and 21 July 1992.

Bacteriological analyses: Most Probable Number (MPN) values were determined for total coliforms and fecal coliforms. The MPN analyses were made at the 95% confidence limits according to the 17th edition of the *Standard Methods for the Analysis of Water and Waste water*, 1990, page 9-78. Five replicates were made from each dilution.

Total coliform analyses were determined by the number of dilutions that were positive for both the Presumptive Test (lauryl tryptose broth) and the Confirmed Test (brilliant green lactose bile broth) as described in the *Standard Methods* manual. Details are given in the attached Procedures Flow Chart (Figure 1).

Fecal coliform analyses were determined by the number of dilutions that were positive in EC medium as described in the *Standard Methods* manual. Details are given in the attached Procedures Flow Chart (Figure 1).

Each time that one of the five EC broth replicates from one dilution exhibited a positive Fecal Coliform test , this culture was streaked on nutrient agar plates to isolate colonies (Nutrient Agar Plate - 1, Figure 1). Each isolated colony was re-streaked a second time to assure culture purity before conducting further tests. Once culture purity was determined, all of the colonies from each dilution series were described and given a letter designation. IMViC tests were then performed on each colony type from each dilution series according to the 1990 edition of the *Standard Methods* manual. Each colony type was also inoculated into an EC-broth tube (EC Broth - 2, Figure 1) to verify that this culture was positive for the fecal coliform reaction.

Once culture purity was assured, culture identification was made with the API-20E test system (Figure 1). Isolate identifications were made on only three of the sampling dates (14 April, 27 May, and 7 June 1992). An Analytical Profile Index number was derived from tests performed on each purified isolate, and a species identification was determined based upon data given in the *Analytical Profile Index of Enterobacteriaceae and other Gram-Negative Bacteria*, 9th edition, 1989.

RESULTS

Identification of colony types from positive fecal-coliform analyses: From each positive EC-broth tube (fecal coliform test) found from duplicate samples taken from the three sampling sites on 14 April, 27 May, and 7 June, we isolated 77 different cultures for identification. These 77 demonstrated only six different colony types. These were designated by letters (a, b, c, e, f, and h), and they are described in the attached Table 1. Even though six colony types were evident, 75 of the 77 colonies isolated were identified by API analyses as either *Escherichia coli* or *Klebsiellia pneumoniae*. Three colony types (b, c, and e) were identified as *E. coli* in 38 of the 41 times isolated. Two colony types (a and f) were identified as *K. pneumoniae* in 33 of the 34 times isolated. The reliability upon which these identifications matched our colony descriptions strongly suggested that we could search back through our descriptions of colony types and reliably predict whether these colony types were *E. coli* or *K. pneumoniae*.

Most probable numbers for *E. coli* and *K. pneumoniae*. We examined our data from each sample taken on each of the 10 sampling trips to determine how many times each colony type was isolated from each positive EC-broth tube (fecal coliform test). One example from such an analysis is shown in the attached Table 2. Here it may be seen that colony type a was isolated in four of the five replicate EC-broth tubes made from the first "dilution" (representing 1.0 ml), in three of the five replicate tubes from the next dilution (representing 0.1 ml), in four of the five replicates from the dilution representing 0.01 ml, and in none of the five replicates in each of the next four dilutions. We then applied the MPN rules given in the *Standard Methods* manual to determine the most probable number of either *E. coli* or *K. pneumoniae* in each sample.

Table 3 shows the most-probable number of API-identified *Escherichia coli* from all three collecting sites. Samples taken from Big Island Dam (upstream from the mill) contained from 3 to 60 *E. coli* per 100 ml of river water during this five-month sampling period. The waste stream outfall (003) contained from 150 to 17,000 *E. coli* per 100 ml , and samples taken from Coleman Falls Dam (about five miles downstream from the mill) contained from 6 to 260 *E. coli* per 100 ml of sample.

Table 4 shows the most-probable number of API-identified *Klebsiella pneumoniae* from all three collecting sites. Samples taken from Big Island Dam (upstream from the mill) contained from 3 to 26 *K. pneumoniae* per 100 ml of river water during this five-month sampling period. The waste stream outfall (003) contained from 170 to 80,850 *K. pneumoniae* per 100 ml , and samples taken from Coleman Falls Dam (about five miles downstream from the mill) contained from 7 to 153 *K. pneumoniae* per 100 ml of sample.

Effect of physical and chemical factors on fecal and total MPNs. Each time samples were taken at the three collection sites, measurements were made of temperature, flow rate, hydrogen-ion concentration, and biochemical oxygen demand (Table 5). This was done to see if there was correlation between these factors and the most-probable numbers for total and fecal coliforms. No such correlation was detected.

DISCUSSION

Colony types and identification of bacteria in positive fecal-coliform tests. When we first saw the variety of colony types isolated from the positive EC-broth tubes prepared from each sample (e.g. see the attached Table 2), we assumed that many different species of coliforms were contributing to the fecal- coliform numbers. However, we identified each colony type (isolate) using the API-20E System, and we found that all but two of the 77 isolates were either *Escherichia coli* or *Klebsiella pneumoniae.* This led us to conclude that both the enteric bacterium *E. coli* and the non-enteric bacterium *K. pneumoniae* give a positive fecal coliform test using EC-Broth at 44.5 degrees C as recommended in the 1990 (17th) edition of *Standard Methods for the Examination of Water and Waste Water.*

Each time that *K. pneumoniae* was isolated from a positive EC-broth tube, this isolate was placed back into sterile EC-broth, and it gave a positive fecal-coliform reaction. Therefore, we are confident that many of the high fecal-coliform (MPN) determinations are caused by the presence of large numbers of *K. pneumoniae* in these samples.

We conclude that the fecal-coliform numbers present in the 003 outfall samples are elevated by the presence of large numbers of *K. pneumoniae* (see the appendices given in the notebook accompanying this report).

There are numerous reports in the literature showing that non-fecal *K. pneumoniae from* pulp- and paper-mill effluents frequently give positive fecal coliform tests.

Presence of *Klebsiella pneumoniae* in samples. Table 4 shows that almost all samples from the Mill-Process Outfall (003) contained far more *K. pneumoniae* than *E. coli.* Therefore, we conclude that the high fecal coliform numbers are caused by *K. pneumoniae* that are present in numbers that are from 5- to 40-times greater than *E. coli.*

It appears that the numbers of *K. pneumoniae* cells in 003 samples vary with the season. Samples taken on 17 March contained about 450-times more *K. pneumoniae* than samples taken on 7 July, and the numbers tended to decrease with time between March and July (Table 4). Since neither BOD, pH, nor flow rates steadily increased or decreased during this time (Table 5), we suspect that these factors did not influence *K. pneumoniae* numbers in the 003 outfall. On the other hand, *K. pneumoniae* numbers did appear to correlate with sample temperatures at the 003 outfall. Numbers appeared to be highest between 17 March and 4 June when temperatures varied from 13 to 24 degrees C. Between 4 June and 21 July, temperatures rose from 24 to almost 30 degrees C, and *K. pneumoniae* numbers decreased from 40,000 per 100 ml to about 200 per 100 m. Since these cells <u>grow</u> at 44.5 degrees C (see EC-broth test in Figure 1), these lower numbers at higher outfall temperatures probably do not reflect the influence of temperature on growth. Instead, we suspect that these cells do not <u>survive</u> as long in the ponds at these elevated temperatures.

We suspect that the higher *K. pneumoniae* numbers at the lower temperatures indicate greater survival of these non-enteric bacteria that are introduced from the plant effluent that contains large quantities of wood-processing wastes.

Presence of *Escherichia coli* in samples. Table 3 shows that there were far fewer *E. coli* in 003 Outfall samples than *K. pneumoniae*. On the other hand, the numbers of *E. coli* were usually higher than the 126 per 100 ml limit recommended by the 1986 EPA Quality Criteria for Water (Gold Book). The highest number of *E. coli* occurred in the 17 March samples. After that, the numbers varied only from about 150 to 1,100 per 100 mls of sample. Could it be that the 17,000 per 100 ml on 17 March represented high numbers remaining from when the town/mill sewage was being treated in these ponds? Could it be that continued use of the treatment system for pulp and paper wastes only will further reduce the numbers of *E. coli* in the Outfall? We suspect that this will happen, but that it will not be shown by doing the standard EC-medium-based MPN determination for fecal coliforms.

It seems likely to us that the *E. coli* in the 17 March 003 Outfall samples are those remaining from when town/mill domestic waste water was being added to this treatment system. Otherwise, where would the *E. coli* be coming from? It seems unlikely that the few animals living in or adjacent to the ponds could contribute significant coliform numbers. Could it be that the nutrients in the treatment ponds can support the growth of *E. coli* introduced by these animals? But, if that were true, we suspect that growth of *E. coli* would be more likely in the summer when temperatures were more favorable. Instead, *E. coli* numbers were lower in the summer (Table 3).

CONCLUSIONS SUPPORTED BY THE DATA:

- Non-enteric bacteria (*Klebsiella pneumoniae)* give a positive fecal-coliform test (growth in EC-broth at 44.5 degrees C within 24 hours).

- The high fecal coliform counts from the 003-Outfall samples are more reflective of *Klebsiella pneumoniae* numbers than *Escherichia coli* numbers.

- Numbers of *Escherichia coli* in the 003-Outfall samples dropped drastically after 17 March, and thereafter fluctuated between 150 and 1,100 per 100 ml during the next 5 months.

- Warmer (summer) temperatures in the treatment ponds favor a lower number of *Klebsiella pneumoniae* in the 003-Outfall samples.

Figure 1

PROCEDURES FLOW CHART

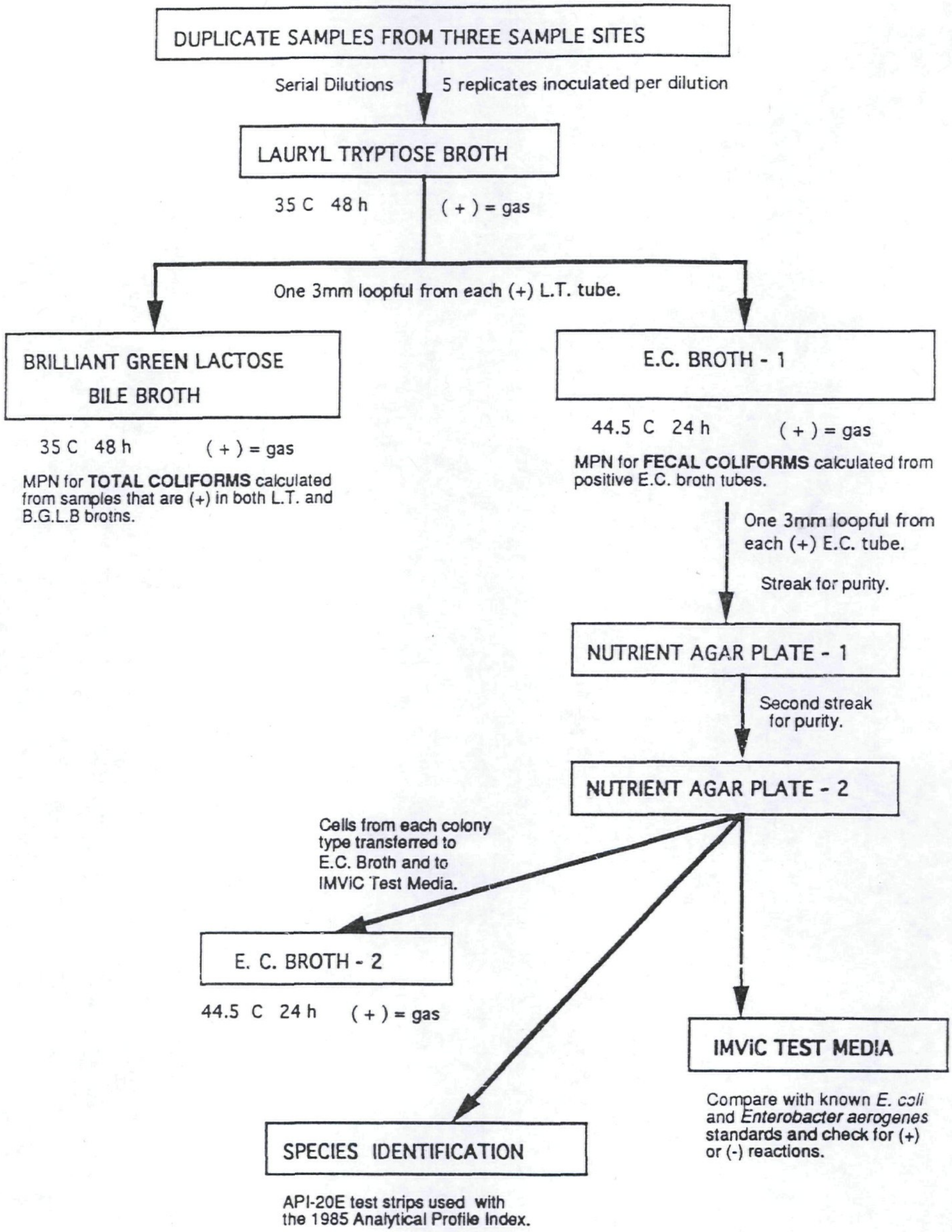

Table 1

IDENTIFICATION OF COLONY TYPES ISOLATED FROM GEORGIA PACIFIC SAMPLES

(revised 9 Oct 92)

Colony Type Isolated [a]	Number Selected for Identification				Number Identified As		
	14 Apr	27 May	7 Jun	TOTAL NUMBER IDENTIFIED [b]	*K. pneu.*[c]	*E. coli* [d]	Other
a	11	10	6	**27**	**26**	1	0
b	6	7	6	**19**	2	**17**	0
c	2	0	1	**3**	0	**3**	0
e	6	8	6	**20**	1	**18**	1
f	1	2	4	**7**	**7**	0	0
h	0	0	1	**1**	0	0	**1**

[a] **Colony types** observed on Nutrient-Agar streak plates inoculated from 24 h E.C. broth tubes. Description of colony types: **a** = 3-4.5 mm diam/shiny surface/domed shape/dense to transmitted light/smooth edge. **b** = 2-5.5 mm diam/dull surface/flat shape/thin with dense center when observed with transmitted light/most of colony is removed when touched. **c** = ca. 4 mm diam/raised shape/feathered edge. **e** = 3-4.5 mm diam/flat shape/concentric rings/smooth edge. **f** = 3.5-5.0 mm diam/domed shape/dense to transmitted light/smooth edge. **h** = 1.5-3.0 mm diam/shiny/domed/dense/yellow/smooth edge. Note that colony types were designated (letters assigned) after purification but before being applied to the API-20 Identification System.

[b] Purified bacteria were identified using the Analytical Profile Index (API-20E) system. Identification data exists as Tables in separate reports for each sampling date. Tables are entitled *Summary of IMViC Reactions, Fecal-Coliform Tests, and Selected Identifications for Colony Types Isolated from (Sample Site - Sample Date)*.

[c] Identifications were based upon data obtained from 59,175 strains of *K. pneumoniae* and published in the *Analytical Profile Index of Enterobacteriaceae and Other Gram-Negative Bacteria*, 9th ed., 1989.

[d] Identifications were based upon data obtained from 96,286 strains of *E. coli* and published in the book cited in footnote [c].

Table 2

MILL-PROCESS OUTFALL (003) - Sample # - 4 Jun 92 [a]

VOL (ml)	REPL #	COLIFORM TESTS: TOTAL (Presum.) L.T. Broth	COLIFORM TESTS: TOTAL (Confirmed) BGLB Broth	COLIFORM TESTS: FECAL E.C. Broth-1	Colony Types Purified From E.C. Broth-1 [b]	PURIFIED CULTURE REACTIONS: Colony Type Selected	Fecal Coliform Test (E.C. Broth-2)	I	M	V	C	Possibility Isolates Are *E. coli* [c]
(1)	1	+	+	+	a,b	b	+	+	+	—	—	+
	2	+	+	+	a,b ,e	a	+	—	—	+	+	—
	3	+	+	+	a,e							
	4	+	+	+	e	e	+	+	+	—	—	+
	5	+	+	+	a,b,e							
(0.1)	1	+	+	+	b	b	+	+	+	—	—	+
	2	+	+	+	a,f	f	—	—	—	+	+	—
	3	+	+	+	a	a	+	—	—	+	+	—
	4	+	+	+	b							
	5	+	+	+	a,e	e	+	+	+	—	—	+
(0.01)	1	+	+	+	a	a	+	—	—	+	+	—
	2	+	+	+	a							
	3	+	+	+	f	f	+	—	—	+	+	—
	4	+	+	+	a							
	5	+	+	+	a							
(0.001)	1	—										
	2	+	+	+	f	f	—	—	—	+	+	—
	3	+	+	+	b,e	b	+	+	+	—	—	+
						e	+	+	+	—	—	+
	4	—										
	5	—										
(0.0001)	1	—										
	2	—										
	3	—										
	4	—										
	5	—										
(0.00001)	1	—										
	2	—										
	3	—										
	4	—										
	5	—										
(0.000001)	1 - 5	—										

[a] Abbreviations: **DIL** = dilution; **REP** = sample replicate number; L.T. = lauryl tryptone broth (Difco); **E.C.** = E.C. broth (Difco); **BGLB.** = brilliant green lactose bile broth (Difco); **LES.** = LES Endo agar (Difco); **I** = test for indole production; **M** = test for acid production (using methylene blue); **V** = test for acetomethylcarbinol production (Voges-Proskauer test); **C** = utilization of citrate as sole carbon source (Difco Simmon's citrate agar); **T** = typical coliform colonies on LES Endo plates; **AT** = atypical coliform colonies on LES Endo plates. All tests performed according to the 17th Edition (1990) of *Standard Methods for the Examination of Water and Waste Water.*

[b] **Colony types** observed on 24h Nutrient-Agar streak plates inoculated from 24 h E.C. broth tubes. Description of colony types: **a** = 3-4.5 mm diam/shiny surface/domed shape/dense to transmitted light/smooth edge. **b** = 2-5.5 mm diam/dull surface/flat shape/thin with dense center when observed with transmitted light/most of colony is removed when touched. **c** = ca. 4 mm diam/raised shape/feathered edge. **d** = 1.5 mm diam/white/smooth edge. **e** = 3-4.5 mm diam/flat shape/concentric rings/smooth edge. **f** = 3.5-5.0 mm diam/domed shape/dense to transmitted light/smooth edge. **g** = 1.0 mm diam/tiny/white/smooth edge. **h** = 1.5-3.0 mm diam/shiney surface/dense to transmitted light/smooth edge.

[c] Based upon known *Escherichia coli* **IMViC** reactions (+ +/— —). Known cultures of *E. coli* and *Enterobacter aerogenes* were analyzed for IMViC reactions at the same time that river and outfall isolates were tested to make sure that the IMViC media was working and positive and negative reactions were correctly interpreted.

Table 3

MOST PROBABLE NUMBER OF *Escherichia coli* [a]

(API-SYSTEM IDENTIFIED) FROM 1992 GEORGIA PACIFIC SAMPLES

Location	Most Probable Number (# per 100 ml of sample)								
	17 Mar	31 Mar	14 Apr	5 May	27 May	4 Jun	23 Jun	7 Ju!	21 Jul
Big Island Dam	47	20	3	27	50	37	40	60	10
Mill-Process Outfall (003)	17,000	588?	150	565	1,100	1,100	435	800	155
Coleman Falls Dam	195	31	7	20	47	125	40	260	6

[a] Cultures from each sampling site were separated by streak-plating on two successive Nutrient-Agar plates as shown on the procedures flow chart. Once purified, each colony type was described and given a letter designation, then each pure culture was identified with the API-20E Test System (see tabbed section of final report entitled *API Identifications*). Based upon these identifications, we determined the frequency that colony types were identified as *E. coli* (see accompanying table entitled *Identification of Colony Types Isolated from Georgia Pacific Samples*). Colony types *a* and *f* were identified as *E. coli* 26 of 27 and 7 of 7 times isolated, respectively. Then we then examined the test results from each sample site to determine how many of the MPN tubes contained those colony types (see accompanying table entitled *Table 6. Mill-Process Outfall (003) - Sample #2 - 4 Jun 92*). From those test results, we determined the average MPN for *E. coli* in the two samples. These numbers are shown here as Most Probable Numbers of *E. coli* in each sample taken over a five-month period in 1992.

Table 4

MOST PROBABLE NUMBER OF *Klebsiella pneumoniae* [a]

(API-IDENTIFIED) IN 1992 GEORGIA PACIFIC SAMPLES

Location	Most Probable Number (# per 100 ml of sample)								
	17 Mar	31 Mar	14 Apr	5 May	27 May	4 Jun	23 Jun	7 Jul	21 Jul
Big Island Dam	26	9	4	6	7	13	24	5	3
Mill-Process Outfall (003)	80,850	43,500	12,500	8,650	33,500	40,000	190	170	720
Coleman Falls Dam	153	21	36	50	31	60	14	10	7

[a] Cultures from each sampling site were separated by streak-plating on two successive Nutrient-Agar plates as shown on the procedures flow chart. Once purified, each colony type was described and given a letter designation, then each pure culture was identified with the API-20E Test System (see tabbed section of final report entitled *API Identifications*). Based upon these identifications, we determined the frequency that colony types were identified as *K. pneumoniae* (see accompanying table entitled *Identification of Colony Types Isolated from Georgia Pacific Samples*). Colony types ***b***, **c**, and **e** were identified as *K. pneumoniae* 17 of 19, 3 of 3, and 7 of 7 times isolated, respectively. Then we then examined the test results from each sample site to determine how many of the MPN tubes contained those colony types (see accompanying table entitled *Table 6. Mill-Process Outfall (003) - Sample #2 - 4 Jun 92*). From those test results, we determined the average MPN for *E. pneumoniae* in each sample. These numbers are in the table above as Most Probable Numbers in each sample taken over a five-month period during 1992.

Table 5

Relationship of Coliforms to Flow Rates and to Physical and Chemical Data

(Revised 6 Oct 92)

#	Sampling Date	River Flow Rate (mil gal/day)	Sampling Location	Outfall Flow Rate (mil gal/day)	Temp. (°C)	pH	Biochemical Oxygen Demand (ppm)	Total Coliforms [MPNs] (#/100 ml)	Fecal Coliforms [MPNs] (#/100 ml)
1	3 Mar 92	3,157	upstream		nd[a]	7.5	2.1	755	40
			outfall 003	5.6	19.5	7.2	81.0	400,000	55,000
			downstream		nd[a]	nd[a]	nd[a]	1,400	275
2	17 Mar 92	3,158	upstream		5.3	8.0	2.7	260	120
			outfall 003	5.7	13.3	7.5	77.3	2,150,000	330,000
			downstream		7.3	8.0	nd[a]	7,500	250
3	31 Mar 92	2,375	upstream		9.6	7.7	2.0	260	100
			outfall 003	6.0	18.3	7.3	77.0	800,000	75,000
			downstream		9.8	8.0	2.3	2,300	240
4	14 Apr 92	1,262	upstream		14.2	8.5	2.1	30	10
			outfall 003	4.9	19.9	7.5	66.9	1,700,000	12,500
			downstream		14.2	8.3	nd[a]	3,700	75
5	5 May 92	1,647	upstream		16.1	8.1	2.2	185	40
			outfall 003	5.7	20.8	7.3	63.1	700,000	8,750
			downstream		17.3	8.2	2.3	1,550	60
6	27 May 92	1,550	upstream		16.3	8.3	nd	650	80
			outfall 003	5.9	22.2	7.4	67.0	50,000	33,500
			downstream		18.4	8.2	1.3	360	65
7	4 Jun 92	1,783	upstream		18.5	8.2	2.4	225	37
			outfall 003	6.0	24.3	7.4	66.9	50,000	50,000.
			downstream		18.3	8.0	2.3	570	315

(continued)

Table 5

Relationship of Coliforms to Flow Rates and to Physical and Chemical Data

(continued)

#	Sampling Date	River Flow Rate (mil gal/day)	Sampling Location	Outfall Flow Rate (mil gal/day)	Temp. (°C)	pH	Biochemical Oxygen Demand (ppm)	Total Coliforms [MPNs] (#/100 ml)	Fecal Coliforms [MPNs] (#/100 ml)
8	23 Jun 92	1,531	upstream		21.5	6.8	3.1	300	75
			outfall 003	5.8	26.0	7.2	66.3	2,600	455
			downstream		22.0	7.0	2.3	75	60
9	7 Jul 92	1,346	upstream		23.5	6.8 [b]	2.0	205	75
			outfall 003	6.0	27.0	7.4 [b]	48.0	7,000	3,000
			downstream		23.5	7.7 [b]	2.2	700	260
10	21 Jul 92	452	upstream		26.2	7.0 [b]	2.0	50	15
			outfall 003	5.0	29.6	7.3 [b]	70.0	1,300	760
			downstream		28.6	7.6 [b]	2.9	20	12

[a] nd = not determined

[b] Determination of pH made after returning to Va Tech laboratory.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Microbiology & Immunology Section
Department of Biology
2119 Derring Hall
Blacksburg, VA 24061-0406

Office (703)-231-5196
Department (703)-231-6407
FAX line (703)-231-9307
BITNET MICROFL at VTVM2

November 18, 1992

Mr. Garry T. Griffith
Environmental & Quality Control Supt.
Georgia—Pacific Corporation
P.O. Box 40
Big Island, VA 24526

Re: Report for Proposal #93-0131-07
Sponsor PO # 043012
FRS # 435156

Dear Garry:

This letter accompanies our final report which is dated 6 November 1992. The final report contains five pages of text, one figure, and five tables. Accompanying this final report is a notebook that contains nine tabbed sections; each section contains all data in table form that was submitted to you as part of the 10 interim reports sent to you during the project period.

Please let me know if you wish for us to add anything to the text of this report or if you wish to discuss any of the points made in our report.

We have enjoyed working with you and Marina on this project. Thank you for your support and kind assistance.

Sincerely,

Bill

G. William Claus, Ph.D.
Associate Professor of
Microbiology

enclosures

Copy sent to: B. Slagle
Va Fibre 3/94

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STATE DEPARTMENT OF HEALTH

Richmond, Virginia

Inter-Office Correspondence

APR 1991 RECEIVED State Water Control Board

TO: Barry T. Dunkley, P. E.
Engineering Field Director
Danville Environmental Field Office, OWP

FROM: C. M. Sawyer, P. E., Director CMS
Division of Wastewater Engineering

SUBJECT: Disinfection of Wastewater - Public Health Significance of Klebsiella Pneumoniae

I am enclosing a copy of a memorandum from Dr. Carl W. Armstrong, Director of the Division of Health Hazards Control, in response to your memorandum to me dated February 20, 1991, concerning the subject disinfection issue. In addition, I am enclosing a copy of a letter to the VWCB from Dr. Robert B. Stroube, Deputy Commissioner for Community Health Services, dated March 2, 1990, concerning the Department's disinfection policy.

Dr. Armstrong has concluded that the principal public health concerns relative to the presence of klebsiella pneumoniae in wastewater effluent discharges result from actual or potential primary recreational use of the receiving water.

Based on the enclosed information, this Division recommends that a site-specific beneficial use-attainability analysis study be performed by the permitted owner, as stipulated and required by the "State Water Quality Standards", to support any proposed modification of the discharge permit requirements for disinfection.

CMS/ecr
cc: Robert B. Stroube, M.D., M.P.H.
Grayson B. Miller, M.D.
Carl W. Armstrong, M.D.
Eric H. Bartsch, P.E.
Allen R. Hammer, P.E.

PA <- PA

COMMONWEALTH of VIRGINIA

M. G. BUTTERY, M.D., M.P.H.
ATE HEALTH COMMISSIONER

Department of Health
Richmond, Virginia 23219
March 29, 1991

MEMORANDUM:

To: C. M. Sawyer, P.E., Director
Division of Wastewater Engineering

From: Carl W. Armstrong, M.D., Director
Division of Health Hazards Control

CWA

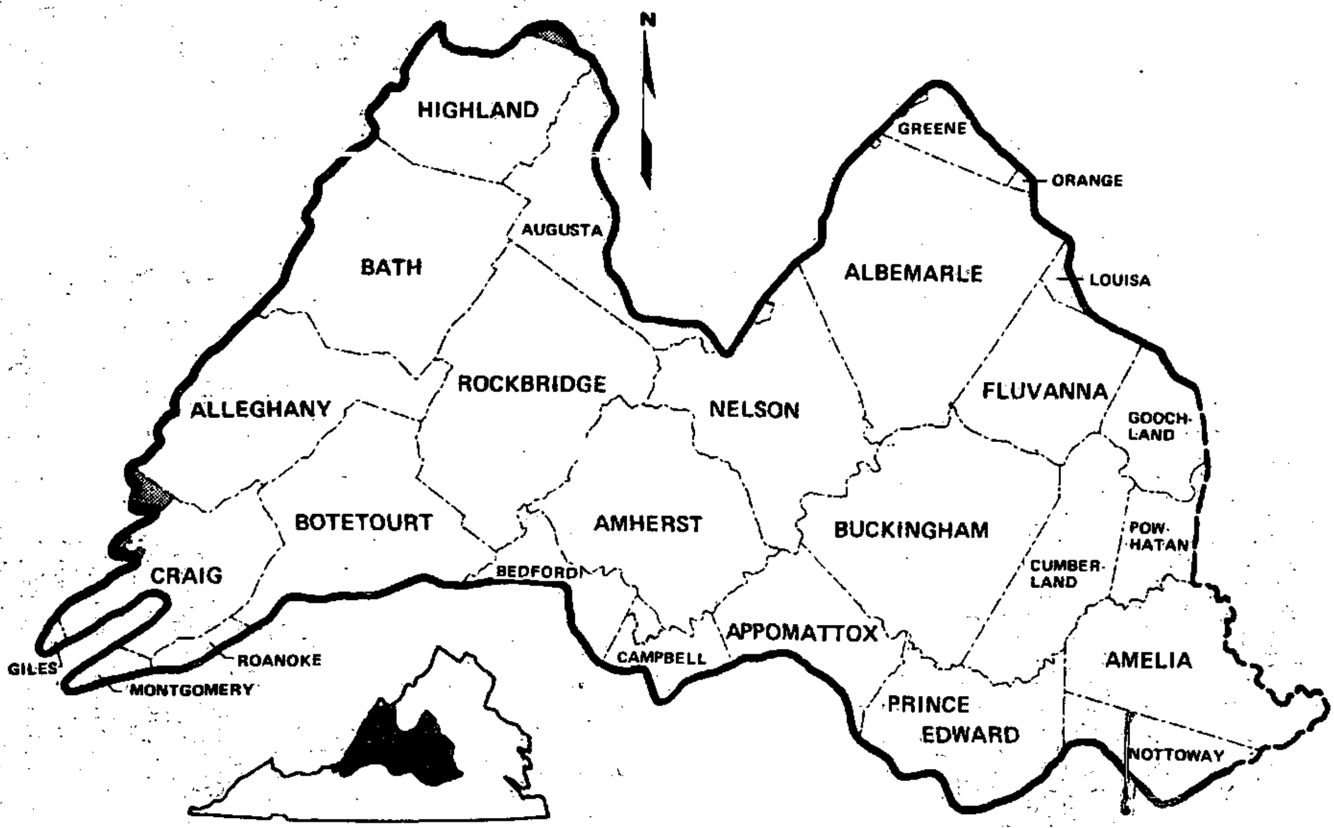
SUBJECT:

In response to your February 25, 1991 memorandum on this subject, I have learned that the outfall in question is 9 miles upriver from the City of Lynchburg's drinking water intake. That utility has also apparently not had problems with excessive fecal coliform counts in the raw water. Given this information, I do not anticipate a public health concern relative to drinking water supplies. Moreover, *Klebsiella* would not be expected to cause infection as a result of ingestion, this organism tends to cause infection only when circumstances allow it to gain access to a normally sterile body site (aspiration into the lungs may cause pneumonia; reflux of urine through a catheter back into the bladder may cause urinary tract infection; washing a surgical incision may lead to wound infection).

Although there is no basis for concern about drinking water, it is more difficult to dismiss the possibility of a recreational hazard. *Klebsiella* has occasionally caused wound infection outside the hospital setting (Rickman LS. *Klebsiella pneumoniae* infection complicating a puncture wound of the foot: a case report. Milit Med 1989;154:38-39). Although *K. pneumoniae* is normally present in the environment, including uncontaminated river water, an appreciable increase in concentration in river water resulting from the outfall could conceivably result in a greater probability of immersion-related infection of a wound (in a fisherman, for example). It is impossible to quantify this risk given the information at hand. It is unlikely that an epidemiologic study of sufficient power will be able to resolve this issue. Also, I do not know to what extent the effluent is diluted in the river or whether in-stream testing has shown "fecal coliforms" (as a surrogate for *K. pneumoniae*) to be present.

VIRGINIA STATE WATER CONTROL BOARD

UPPER JAMES RIVER BASIN



COMPREHENSIVE WATER RESOURCES PLAN

VOLUME V-A

PART I OF 3

SUMMARY REPORT

WATER QUALITY MANAGEMENT PLAN

PLANNING BULLETIN 217-C

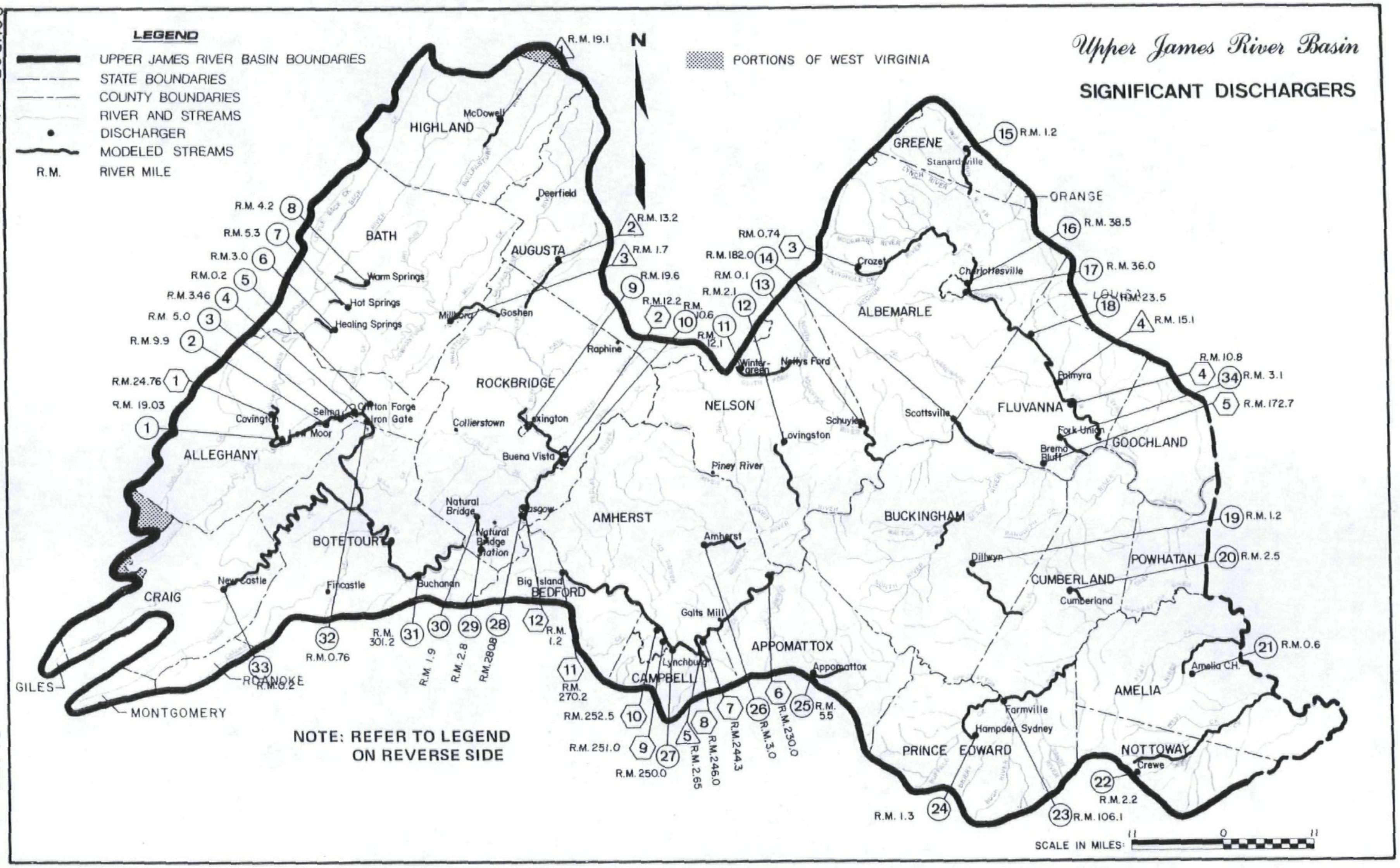
1976

PREPARED FOR THE

VIRGINIA STATE WATER CONTROL BOARD

BY

WILEY AND WILSON, INC



SOURCE: WILEY & WILSON, INC.

PLATE NO. 2

Table 1

(Legend for Plate 2)
Significant Dischargers

⬡ Significant Industrial Dischargers

1. Westvaco*
2. Georgia-Bonded Fibers, Inc.*
3. Morton Frozen Foods*
4. Schwarzenbach Huber
5. Bremo Bluff VEPCO
6. Virginia Fibre, Inc.
7. Babcock & Wilcox, Inc.
8. Lynchburg Foundry (Archer Creek Plant)
9. Lynchburg Foundry (Lynchburg Plant)
10. Glamorgan
11. Owens-Illinois
12. Burlington Industries (Lees Carpets)*

△ Potential Significant Municipal Dischargers

1. McDowell
2. Craigsville
3. Millboro
4. Palmyra
5. Concord

○ Significant Municipal Dischargers**

1. Covington STP
2. Low Moor STP*
3. Selma STP*
4. Clifton Forge STP*
5. Cliftondale Park STP*
6. Ashwood-Healing Springs STP*
7. Hot Springs STP
8. Warm Springs STP*
9. Lexington STP
10. Buena Vista STP*
11. Wintergreen STP
12. Lovingston STP*
13. Schuyler STP
14. Scottsville STP
15. Stanardsville STP*
16. Charlottesville - Meadow Creek STP*
17. Charlottesville - Moores Creek STP*
18. Lake Monticello STP
19. Dillwyn STP*
20. Cumberland High School STP*
21. Amelia Sanitary District*
22. Crewe STP*
23. Farmville Lagoons*
24. Hampden-Sydney College STP*
25. Appomattox Lagoon*
26. Amherst STP*
27. Lynchburg STP*
28. Glasgow STP*
29. Natural Bridge Camp for Boys STP
30. Natural Bridge STP
31. Buchanan STP
32. Iron Gate STP*
33. New Castle STP*
34. Fork Union Military Academy

*Continuing Planning "Significant" Dischargers

**Recent investigations have shown that Mallow-Altamont can be considered as a significant discharge to the Jackson River which was apparently not included in this water quality analysis. However, this discharge should be integrated into the future planning process.

France,Becky

From: Aschenbach, Ernie (DGIF)

Sent: Wednesday, September 16, 2009 1:03 PM

To: France,Becky; Daub,Elleanore; Watson, Brian (DGIF)

Cc: Aschenbach, Ernie (DGIF)

Subject: ESSLog# 26500; DEQ VPDES re-issuance# 0003026 for the GP Big Island, LLC facility in Bedford County, Virginia

We have reviewed the application for the re-issuance of the Virginia Pollution Discharge Elimination System (VPDES) permit# 0003026 for the GP Big Island, LLC facility in Bedford County, Virginia. The facility discharges to the James River. According to the information provided, Total Residual Chlorine (TRC) is added to cooling water at a monthly average of 0.012 mg/l and a daily average of 0.024 mg/l. According to the application, water discharged from outfall 002 and 003 is de-chlorinated. Sanitary waste generated at the facility is transported to the Lynchburg Municipal Wastewater Treatment Plant for disposal.

According to our records, the state Threatened (ST) green floater is known from the area. The reach of the James River is designated Threatened and Endangered (T&E) species water for this species.

Due to the sensitivity of these species, we recommend and support that the Effluent Limitations and Monitoring Requirements specify (the above-referenced) monthly and daily average ammonia concentrations of no more than 1.0 mg/l. In order to protect the overall health of the aquatic resources, we recommend that effluent from this facility either be treated with ultraviolet light disinfection rather than chlorine, or continue to be de-chlorinated prior to discharge.

Thank you for the opportunity to provide comments.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230
Phone: (804) 367-2733
FAX: (804) 367-2427
Email: Ernie.Aschenbach@dgif.virginia.gov

L. Preston Bryant, Jr.
Secretary of Natural Resources

Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951 FAX (804) 371-2674

April 30, 2009

Becky France
DEQ-West Central Regional Office
3019 Peters Creek Road
Roanoke, VA 24019

Re: VA0003026, GP Big Island

Dear Ms. France:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the ifnormation currently in our files, the Yellow lance (*Elliptio lanceolata*, G2G3/S2S3/SOC/SC) has been documnted within the discharge area. The Yellow lance occurs in mid-sized rivers and second and third order streams. To survive, it needs a silt-free, stable streambed and well-oxygenated water that is free of pollutants. In Virginia, the Yellow lance is currently known from populations in the Chowan, James, York, Rappahannock, and Potomac River drainages. Please note that this species is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS) and a special concern species by the Virginia Department of Game and Inland Fisheries (VDGIF); however, these designations have no official legal status.

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species.

To minimize impacts to aquatic resources, DCR recommends the use of uv/ozone to replace chlorination disinfection and utlization of new technologies as they become available to improve water quality.

Our files do not indicate the presence of any State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Shirl Dressler at (804) 367-6913.

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,

Rene' Hypes

S. Rene' Hypes
Project Review Coordinator

CC: Tylan Dean, USFWS

Literature Cited

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. *Conservation status of freshwater mussels of the United States and Canada.* Fisheries 18: 6-9.

France, Becky (DEQ)

From: Aschenbach, Ernie (DGIF)

Sent: Tuesday, June 15, 2010 5:10 PM

To: France, Becky (DEQ); Daub, Elleanore (DEQ)

Cc: ProjectReview (DGIF); Watson, Brian (DGIF)

Subject: FW: ESSLog# 30939; DEQ VPDES permit# VA0003026 renewal for the GP Big Island, LLC In Big Island, Virginia

We have reviewed the VPDES permit# VA0003026 renewal for the GP Big Island, LLC In Big Island, Virginia. According to the application, the following changes to the existing effluent characteristics and monitoring are proposed:

- **Outfalls number 001 and 002** will no longer discharge chlorine as a component of the non-contact cooling water. Therefore, the applicant requests the removal of monitoring requirements for Total Residual Chlorine (TRC). The applicant requests the thermal monitoring frequency be reduced from 5 times per week to 3 times per week, based on a consistent record of no exceedances for a period of 2-years.
- **Outfall number 003.** The applicant requests the effluent monitoring frequency (of Biological Oxygen Demand {BOD} and Total Suspended Solids {TSS}) be reduced from 5 times per week to 1 time per week, based on a consistent record of no exceedances for a period of 2-years. Chlorine will still be used to treat sanitary wastewater. We could not find a description of effluent characteristics for Ammonia as Nitrogen (cited as attachment J) or Chlorine, corresponding with this discharge.

According to our records, the state Threatened (ST) green floater and federal Species of Concern state Special Concern (FSSS) yellow lance mussels are known from the project area. The James River is a designated Threatened and Endangered (T&E) species water for the green floater.

In order to protect the overall health of the aquatic resources, we recommend the use of ultraviolet (UV) light disinfection, rather than chlorination. We recognize and support that chlorine will no longer be added to cooling water discharged from outfalls number 001 and 002. We recommend continued monitoring of the above-referenced thermal discharges. In general, the ammonia limits proposed within the EPA rule are expressed on the basis of total ammonia-nitrogen (TAN). The proposed EPA ammonia limit for waters with mussels (not T&E mussels, <u>any</u> mussel species) is:

CMC (Criterion Maximum Concentration or acute) - 2.9 mg N/L (at pH 8 and 25C)

CCC (Criterion Continuous Concentration or chronic) - 0.26 mg N/L (at pH 8 and 25C) with a 4-day average within the 30 day average period no higher than 2.5 the CCC, which would be 0.65 mg N/L.

The ammonia limits proposed within the EPA rule are the best information currently available regarding ammonia levels protective of mussels. Therefore, we recommend the EPA values be implemented in this permit for this and all future VPDES permits.

Thank you for the opportunity to provide comments.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230
Phone: (804) 367-2733
FAX: (804) 367-2427
Email: Ernie.Aschenbach@dgif.virginia.gov

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951

June 16, 2010

Becky France
DEQ-BRRO
3019 Peters Creek Road
Roanoke, VA 24019

Re: VA0003026, GP Big Island, LLC

Dear Ms. France:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

The James River-Big Island Stream Conservation Unit (SCU) is within the project site. SCUs are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. They are polygons built around one or more rare plant, animal, or natural community designed to include the element and, where possible, its associated habitat, and buffer or other adjacent land thought necessary for the element's conservation. SCUs are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain; on a scale of 1-5, 1 being most significant. The James River-Big Island SCU has been given a biodiversity significance ranking of B3, which represents a site of high significance. The natural heritage resources associated with this SCU are:

Polanisia dodecandra ssp. dodecandra	Common Clammy-weed	G5T5?/NL/S2/NL
	Riverside Praire	GNR/SNR/NL/NL

Common clammy-weed is extremely rare in Virginia. This plant has only been found on cobble bars and within disturbed riverine habitats along the James River (Ludwig, 1998). It is currently known from 12 occurrences and historically known from 1 occurrence in Virginia.

Riverside prairies are globally and state rare, consisting of temporarily flooded, sparse shrub and dense grassland vegetation of stabilized outcrop of boulder bars along the shores of major mountain and Piedmont rivers. In Virginia, this natural community is known from the Potomac River gorge west of Washington, D.C. and the James River near the Blue Ridge (Fleming et al., 2006).

In addition, the Yellow lance (*Elliptio lanceolata*, G2G3/S2S3/SOC/SC) has also been documented within the project area. The Yellow lance occurs in mid-sized rivers and second and third order streams. To survive, it needs a silt-free, stable streambed and well-oxygenated water that is free of pollutants. This species has been the subject of taxonomic debate in recent years (NatureSErve, 2009). Currently in Virginia, the Yellow lance is recognized from populations in the Chowan, James, York, and Rappahannock drainages. Its range also extends into Neuse-Tar river system in North Carolina. In recent years, significant population declines have been noted across its range (NatureServe, 2009). Please note that this species is currently classified as a species of concern by the United States Fish and Wildlife Service (USFWS) and a special concern species by the Virginia Department of Game and Inland Fisheries (VDGIF); however, these designations have no official legal status.

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species. The Yellow lance may be particularly sensitive to chemical pollutants and exposure to fine sediments from erosion (NatureServe, 2009).

To minimize impacts to aquatic resources, DCR recommends the use of uv/ozone to replace chlorination disinfection and utilization of new technologies as they become available to improve water quality.

Our files do not indicate the presence of any State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Shirl Dressler at (804) 367-6913.

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,

Rene' Hypes

S. Rene' Hypes
Project Review Coordinator

Cc: Tylan Dean, USFWS

Attachment E

Ambient Water Quality Data

- **Raw Water pH and Temperature Data**
- **Upstream STORET Data (Station 2-JMS282.28)**
- **Downstream STORET Data (Station 2-JMS275.75)**
- **Ammonia Expected Instream Concentration Prior to 1996 Expansion**

VAW-H01R
2-JMS275.75 (downstream from GP Big Island)

Collection Date Time	Temp Celsius	pH (S.U.)
1/14/2003 12:20	2.5	8.45
2/20/2003 12:00	4	7.7
3/4/2003 13:30	7.3	8
4/8/2003 12:30	11.1	8.3
5/5/2003 13:30	16	8.3
6/2/2003 13:00	16.3	8.1
7/23/2003 13:00	25.6	8.1
9/8/2003 12:30	21	8.2
11/18/2003 13:30	11.3	8
1/29/2004 13:00	5.3	8.4
3/11/2004 13:30	7.9	8.1
5/11/2004 13:30	22.4	8.5
7/19/2004 13:30	24.7	7.8
9/7/2004 13:00	23.3	8.3
11/22/2004 13:30	12.7	8.4
1/12/2005 13:00	8.7	7.9
3/30/2005 14:00	11.2	7.8
5/9/2005 13:30	16.9	8.9
7/11/2005 14:00	25.8	8
9/7/2005 13:00	24.8	8.4
11/1/2005 13:00	11.8	8.35
1/5/2006 10:30	6.5	7.8
3/20/2006 13:30	9.7	7.7
5/2/2006 13:30	17.2	7.7
7/13/2006 12:30	25.9	8.2
9/6/2006 13:00	21.4	7.9
11/28/2006 13:00	8.5	7.7
2/12/2007 14:10	1.2	8.2
4/18/2007 11:45	10.6	7.7
6/6/2007 10:45	21.9	8
8/2/2007 10:45	27.8	8.1
10/10/2007 11:30	23.3	8.1
12/27/2007 12:00	5.3	7.4
2/14/2008 12:15	3.5	7.3
4/2/2008 11:25	12.5	7.7
6/18/2008 12:15	26.5	7.9
8/6/2008 11:20	27.1	8
10/22/2008 11:40	13.6	8
12/17/2008 12:50	6.9	7.2
2/24/2009 13:30	4.1	6.8
4/9/2009 13:00	10.1	7.1
6/30/2009 13:00	25.7	8
8/6/2009 13:00	26.1	7.8
10/8/2009 14:00	18.4	7.4
12/10/2009 13:00	9	6.9

pH 90th percentile	8.4 S.U.
pH 10th percentile	7.3 S.U.
temperature 90th percentile (Jan. - May)	16.9 °C
temperature 90th percentile	25.9 °C

Data used for storm water wasteload allocations only.

VAW-H01R
2-JMS275.75

Collection Date Time	Hardness, Total (mg/L as $CaCO_3$)
1/6/1998 12:30	71.1
2/10/1998 11:00	73.2
3/4/1998 11:20	75.9
4/21/1998 13:05	46.7
5/13/1998 13:10	55.8
6/15/1998 12:50	116
7/13/1998 14:30	140
8/4/1998 11:20	142
9/17/1998 11:25	151
10/21/1998 12:00	154
11/19/1998 11:35	168
12/1/1998 12:15	174
1/25/1999 12:30	68
2/9/1999 11:50	80
3/8/1999 12:20	72
4/13/1999 11:50	110
5/18/1999 8:55	56
6/7/1999 12:05	140
7/19/1999 11:45	126
8/9/1999 12:30	132
9/8/1999 12:00	71.6
11/9/1999 11:30	91
12/7/1999 14:20	94.6
1/11/2000 12:00	120
2/8/2000 12:00	118
3/2/2000 12:00	79
4/18/2000 11:20	69
5/17/2000 13:35	102
6/27/2000 11:40	103
7/20/2000 9:55	118
8/17/2000 10:00	122
9/18/2000 9:00	110
10/24/2000 14:30	131
11/28/2000 9:30	147
12/18/2000 11:00	112
1/29/2001 11:00	88.1
2/21/2001 10:00	113
4/3/2001 11:05	<5 *
5/10/2001 14:45	91.2
6/7/2001 11:00	93.9
7/24/2001 14:00	140
8/7/2001 13:00	112
9/10/2001 14:00	128
10/10/2001 14:00	141
11/19/2001 13:30	143
12/19/2001 13:30	120

Mean Hardness 101 mg/L
*<5 mg/L considered outlier so it was not included in calculation.

Data used for storm water allocations only.

VAW-H01R
2-JMS275.75

Collection Date Time	Hardness, Total (mg/L as $CaCO_3$)
1/14/2002 14:00	143
2/4/2002 13:30	74.7
3/11/2002 13:30	98.2
4/1/2002 14:30	60
5/2/2002 10:15	64.4
6/4/2002 12:00	114
7/30/2002 12:30	101
8/29/2002 11:15	25.6
9/25/2002 11:50	176
10/31/2002 10:45	106
11/19/2002 12:10	54.7
12/18/2002 12:00	60.3
1/14/2003 12:20	77.6
2/20/2003 12:00	52.5
3/4/2003 13:30	45.3
4/8/2003 12:30	70.9
5/5/2003 13:30	62.5
6/2/2003 13:00	59.5

GP Big Island
VA0003026

Intake pH Data (S.U.)

DMR Due Date	Minimum	Maximum
10-Jan-07	7.2	8.6
10-Feb-07	7.2	7.8
10-Mar-07	7.4	8.2
10-Apr-07	6.8	8.1
10-May-07	7.1	7.8
10-Jun-07	7.7	8.8
10-Jul-07	7.5	8
10-Aug-07	7.7	8.3
10-Sep-07	7.4	8.4
10-Oct-07	8	8.4
10-Nov-07	7.7	8.4
10-Dec-07	7.7	8
10-Jan-08	7.2	8.6
10-Feb-08	7.4	8.4
10-Mar-08	7.5	8.1
10-Apr-08	7.3	8.2
10-May-08	7.4	7.8
10-Jun-08	7.1	8
10-Jul-08	7.6	7.9
10-Aug-08	7.7	8.3
10-Sep-08	7.8	8.5
10-Oct-08	7.5	8.5
10-Nov-08	8	8.7
10-Dec-08	7.9	8.2
10-Jan-09	7.3	8.1
10-Feb-09	7.3	8
10-Mar-09	7.2	8
10-Apr-09	7.1	8.2
10-May-09	6.8	7.6
10-Jun-09	7	8.3
10-Jul-09	6.6	8.3
10-Aug-09	7.5	8.2
10-Sep-09	7.1	8
10-Oct-09	7.8	8.3
10-Nov-09	7.6	8.3
10-Dec-09	7.1	7.6

90th Percentile pH	8.6 S.U.
10th Percentile pH	7.1 S.U.

GP Big Island
VA0003026

Intake Temperature Data (°C)

Date DMR Due	Temperature
10-Jan-07	15
10-Feb-07	13
10-Mar-07	10.5
10-Apr-07	18
10-May-07	25
10-Jun-07	25
10-Jul-07	28
10-Aug-07	28
10-Sep-07	29.3
10-Oct-07	27
10-Nov-07	25
10-Dec-07	14
10-Jan-08	12
10-Feb-08	11
10-Mar-08	15
10-Apr-08	15
10-May-08	20
10-Jun-08	23
10-Jul-08	30
10-Aug-08	29
10-Sep-08	28
10-Oct-08	25
10-Nov-08	20
10-Dec-08	18
10-Jan-09	11
10-Feb-09	11
10-Mar-09	13
10-Apr-09	16
10-May-09	21
10-Jun-09	24
10-Jul-09	26
10-Aug-09	28
10-Sep-09	28
10-Oct-09	26
10-Nov-09	20
10-Dec-09	16

90th Percentile Temperature	28 °C	
90th Percentile Temperature	25 °C	January - May

VAW-H01R
2-JMS282.28 (upstream from GP Big Island)

Collection Date Time	Temp Celsius	pH (S.U.)
1/14/2002 15:00	4.4	9
2/4/2002 14:00	7.5	8.7
3/11/2002 14:00	10.7	8
4/1/2002 15:00	14.2	8.1
5/2/2002 10:45	17.71	7.57
6/4/2002 12:30	28.2	8.38
7/30/2002 12:55	29.6	8.57
8/29/2002 12:00	24	8.08
9/25/2002 12:20	23	8.84
10/31/2002 11:20	11.7	8.94
11/19/2002 12:45	8.5	7.42
12/18/2002 12:45	5.5	8.63
1/14/2003 12:45	1.9	8.82
2/20/2003 13:00	4.1	8
3/4/2003 14:00	6.5	8.2
4/8/2003 13:00	10.9	8
5/5/2003 14:30	15.5	8.1
6/2/2003 14:00	16.1	8.4
7/23/2003 12:00	25	7.9
9/8/2003 13:00	22	8.2
11/18/2003 14:00	10.9	8.1
1/29/2004 14:00	3	8.4
3/11/2004 14:00	8.3	8.3
5/11/2004 14:00	21.7	8.2
7/19/2004 14:00	24.4	8
9/7/2004 14:00	23.3	8.3
11/22/2004 14:00	12.7	8.5
1/12/2005 14:00	8.9	8
3/30/2005 15:00	11.8	7.7
5/9/2005 14:00	16.4	8.5
7/11/2005 14:30	25.6	7.1
9/7/2005 13:30	24.8	8.4
11/1/2005 13:30	12.3	8.4
1/5/2006 11:00	6.4	7.9
3/20/2006 14:00	9.8	7.9
5/2/2006 14:00	16.7	7.6
7/13/2006 13:00	25.7	7.7
9/6/2006 13:30	21.2	7.9
11/28/2006 13:30	8.8	7.7
2/12/2007 13:30	1	8.3
4/18/2007 11:25	10.5	7.5
6/6/2007 10:20	21	7.8
8/2/2007 10:15	27.1	7.9
10/10/2007 11:05	23	8.1
12/27/2007 11:35	4.8	7.1
2/14/2008 11:55	3.4	6.9
4/2/2008 11:05	12.7	7.6
6/18/2008 12:00	24.6	7.5
8/6/2008 10:55	26.2	8
10/22/2008 11:20	13.1	7.8

pH 90th percentile	8.6 S.U.
pH 10th percentile	7.4 S.U.
temperature 90th percentile (Jan. - May)	16.6 °C
temperature 90th percentile	25.9 °C

Data not used for wasteload allocation spreadsheet calculation. Raw Data intake data used instead.

VAW-H01R
2-JMS282.28 (upstream from GP Big Island)

Collection Date Time	Hardness, Total (mg/L as $CaCO_3$)
1/6/1998 12:05	114
2/10/1998 11:20	86.6
3/4/1998 11:45	87.3
4/21/1998 12:45	69
5/13/1998 13:30	72.8
6/15/1998 13:10	116
7/13/1998 14:00	140
8/4/1998 11:50	150
9/17/1998 12:00	150
10/21/1998 11:30	146
11/19/1998 12:00	131
12/1/1998 11:50	177
1/25/1999 12:10	70
2/9/1999 12:20	96
3/8/1999 12:45	84
4/13/1999 12:20	126
5/18/1999 8:30	64
6/7/1999 12:25	133
7/19/1999 11:20	128
8/9/1999 12:55	132
9/8/1999 12:20	73.6
11/9/1999 11:50	95.3
12/7/1999 14:45	104
1/11/2000 12:25	126
2/8/2000 12:25	136
3/2/2000 12:25	84
4/18/2000 11:40	85
5/17/2000 14:10	113
6/27/2000 12:00	104
7/20/2000 9:30	127
8/17/2000 9:30	121
9/18/2000 8:20	109
10/24/2000 15:00	133
11/28/2000 10:00	136
12/18/2000 11:30	87.5
1/29/2001 11:30	89.3
2/21/2001 11:00	110
4/3/2001 9:30	39.8
5/10/2001 15:25	105
6/7/2001 10:30	107
7/24/2001 14:30	135
8/7/2001 14:00	94.1
9/10/2001 14:30	144
10/10/2001 14:30	148
11/19/2001 14:30	212
12/19/2001 14:00	111
1/14/2002 15:00	130
2/4/2002 14:00	84.3
3/11/2002 14:00	52.1
4/1/2002 15:00	49.1
5/2/2002 10:45	64.7
6/4/2002 12:30	121
7/30/2002 12:55	145
8/29/2002 12:00	36.6
9/25/2002 12:20	128

VAW-H01R
2-JMS282.28 (upstream from GP Big Island)

Collection Date Time	Hardness, Total (mg/L as $CaCO_3$)
10/31/2002 11:20	83.3
11/19/2002 12:45	67
12/18/2002 12:45	69.7
1/14/2003 12:45	88.6
2/20/2003 13:00	77.7
3/4/2003 14:00	51.5
4/8/2003 13:00	64.7
5/5/2003 14:30	71.9
6/2/2003 14:00	77

Mean Hardness 104 mg/L

Analysis of the GP 003 a :e mixing zone [redacted] da for ammonia
(after 5:1 dilution)

The statistics for ammonia are:
    Number of values   = 24   Applies to acute standard only
    Quantification level   = .1
    Number < quantification   = 3   Effluent data used as
    Expected value   = .2875171
    Variance   = 3.081173E-02   existing instream data
    C.V.   = .6105123
    Statistics used   = delta lognormal
The Standards for ammonia are:
    Acute Standard   = 1.39
    Chronic Standard   = .317
    Human Health Standard   = ----

The 97th percentile of daily values   =   .7212251
[redacted]
The 97th percentile of 30 day averages =   .3477989

The Acute standard is not violated.
[redacted]

DATA
.6
.2
.18
.08
.12
.36
.54
.24
.2
.42
.3
.32
.52
.5
.28
.34
.18
.16
.16
.06
.08
.12
.24
.56

Analysis of the James Ri r at RM 275.75 prior to Nc 1994 [redacted] data for ammonia

establishes existing concentration instream prior to expansion under chronic conditions

The statistics for ammonia are:
- Number of values = 75
- Quantification level = .04
- Number < quantification = 37
- Expected value = 5.474539E-02
- Variance = 6.008601E-04
- C.V. = .4477536
- Statistics used = delta lognormal

The Standards for ammonia are:
- Acute Standard = 2.028
- Chronic Standard = .462
- Human Health Standard = ----

downstream

The 97th percentile of daily values = .116928
The 97th percentile of 4 day averages = .075888
The 97th percentile of 30 day averages = 6.170455E-02

The Acute standard is not violated.
The Chronic standard is not violated.
The Human health standard is not violated.

DATA

<.04	<.04	.05
<.04	<.04	.09
.07	.08	.05
<.04	.16	.1
.04	.09	.07
.12	<.04	<.04
<.04	<.04	
.01	<.04	
<.04	<.04	
<.04	.05	
.05	.04	
<.04	.05	
<.04	.04	
.08	.04	
.07	.05	
.07	<.04	
.07	<.04	
.04	<.04	
<.04	.09	
<.04	<.04	
<.04	<.04	
<.04	<.04	
<.04	.08	
.04	.07	
.06	.08	
.05	.04	
.14	.06	
.08	<.04	
.12	<.04	
.04	<.04	
<.04	.07	
<.04	<.04	
<.04	0.04	
<.04	<.04	
<.04		

Attachment F

Ground Water

- **Ground Water Data Evaluation Memorandum**
- **Ground Water Management Program Plan (Excerpt)**

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Ground Water Monitoring Data Evaluation
VPDES Permit No. VA0003026
TO: Permit File
FROM: Becky L. France, Environmental Engineer Senior BLF
DATE: March 8, 2010

INTRODUCTION:
GP Big Island operates a pulp and paper mill in Big Island, Virginia which produces corrugated paper medium via a semi-chemical process and linerboard from recycled corrugated cardboard. None of the process treatment ponds are lined. Therefore, the permittee has been required to conduct semi-annual ground water monitoring of nine monitoring wells.

A revised Ground Water Management Plan was approved on December 7, 2001. This revised plan included replacing MW-9 with MW-9R. For the previous permit, surface water adjacent to the ponds was discontinued since it was a questionable value in detecting leaks from the ponds.

Ground water data have been analyzed for total organic carbon, dissolved cadmium, dissolved chromium, dissolved lead, dissolved zinc, ammonia, color, chloride, pH, and dissolved sodium. Monitoring wells have been installed to determine if there is ground water contamination from three areas the primary equalization basins; the aeration basin and final settling basin; and the sludge lagoons. The ground water in the vicinity of the primary equalization basins is being evaluated with one upgradient well (MW-6) and two downgradient wells (MW-7, MW-8). The ground water in the vicinity of the aeration basin and final settling basin is being evaluated with one upgradient well (MW-9R) and two downgradient wells (MW-10, MW-11). The ground water from the vicinity of the sludge lagoons is being evaluated with one upgradient well (MW-12) and two downgradient wells (MW-13, MW-14). The parameters have been compared with the ground water standards.

The attached tables include a compilation of the ground water data collected from August 1992 through October 2009. The table below summaries the data ranges for each of the wells, and the number of excursions from the ground water standards is listed in parenthesis.

Primary Equalization Basins Area

Well ID	TOC	NH3* (mg/l)	Chloride	Color	Cd	Cr	Pb	Na	Zn	pH (S.U.)
#	10	0.025	25	15	0.4	50	50	25	50	5.5-8.5
6 (u)	1.8-23.9(5)	0.008-16 (29)	4-28 (2)	nd-1500 (7)	nd-3 (4)	nd-2 (0)	nd-25.8 (0)	5.5-25.8 (1)	nd-231 (3)	6.0-7.6 (0)
7 (d)	3.7-42.9 (3)	nd-3.1 (26)	17-42.5 (23)	nd-1000 (10)	nd-1.5 (2)	nd-3.8 (0)	nd-10 (0)	34-156 (30)	nd-240 (3)	6.0-6.8 (0)
8 (d)	1.5-38.4 (4)	nd-5.2 (26)	4-44 (15)	nd-1100 (10)	nd-7.2 (4)	nd-2.7 (0)	nd-9 (0)	11-145 (27)	nd-241 (3)	5.6-7.6 (0)

Aeration Basin and Final Settling Basin Area

Well ID	TOC	NH3* (mg/l)	Chloride	Color	Cd	Cr	Pb	Na	Zn	pH (S.U.)
#	10	0.025	25	15	0.4	50	50	25	50	5.5-8.5
9/9R (u)	nd-12.8 (2)	nd-1.6 (9)	3-23 (0)	nd-340 (10)	nd-2.4 (9)	nd-4 (0)	nd-1 (0)	3.0-89.1 (5)	nd-188 (2)	5.0-7.6 (7)
10 (d)	2.3-61.7 (5)	nd-4.1 (26)	2-1100 (12)	nd-1100 (9)	nd-4.4 (3)	nd-4.9 (0)	nd-9 (0)	12-200 (24)	nd-175 (3)	6.0-7.6 (0)
11 (d)	2.8-45.6 (15)	nd-63.2 (29)	15-83.5 (28)	nd-468 (20)	nd-8.1 (8)	nd-4.9 (0)	nd-17 (0)	85-476 (30)	nd-277 (3)	6.1-7.39 (0)

Sludge Lagoons Area

Well ID	TOC	NH3* (mg/l)	Chloride	Color	Cd	Cr	Pb	Na	Zn	pH (S.U.)
#	10	0.025	25	15	0.4	50	50	25	50	5.5-8.5
12 (u)	nd-10.7 (1)	nd-3.0 (8)	6-96.5 (16)	nd-360 (9)	nd-6.8 (2)	nd-3 (0)	nd-5 (0)	6-84 (6)	nd-77 (3)	5.5-7.6 (0)
13 (d)	1.4-44.8 (5)	nd-1.0 (10)	15-38.6 (23)	nd-166 (5)	nd-28.0 (27)	nd-2 (0)	nd-3 (0)	62-235 (30)	nd-438 (3)	5.3-7.6 (2)
14 (d)	1.4-34.0 (6)	nd-2.3 (26)	25-45 (30)	nd-250 (9)	<0.4-6 (12)	nd-3 (0)	nd-8 (0)	53-203 (30)	nd-392 (3)	5.3-7.6 (2)

(u) upgradient
(d) downgradient

DISCUSSION:

Primary Equalization Basins Area
Data for the upgradient well indicates at least one data point was higher than the ground water criteria for ammonia, chloride, color, cadmium, sodium, TOC, and zinc. All pH data for the upgradient and downgradient wells met ground water standards. All chromium and lead data for the upgradient and downgradient wells met ground water standards. There were exceedances in the ground water standards for TOC, ammonia, chloride, color, cadmium, sodium, and zinc in the upgradient and downgradient wells.

Aeration Basin and Final Settling Basin Area
Data for the upgradient well indicates at least one data point was higher than the ground water criteria for TOC, ammonia, color, cadmium, sodium, pH, and zinc. All pH data for the downgradient wells met the ground water standards. All chromium and lead data for the upgradient and downgradient wells met ground water standards. There were exceedances in the ground water standards for TOC, ammonia, color, cadmium, sodium, and zinc in the upgradient and downgradient wells. There were no exceedances in the ground water standard for chloride at the upgradient well but there were exceedances in the ground water standards for the downgradient wells. Chloride levels appear to be significantly higher in downgradient wells and there are consistently more exceedances of sodium in the downgradient wells.

Sludge Lagoon Area
Data for the upgradient well indicates at least one data point was higher than the ground water criteria for TOC, ammonia, chloride, color, cadmium, sodium, and zinc. The upgradient pH data met the ground water standards but not all the downgradient data met the ground water standards. All chromium and lead data for the upgradient and downgradient wells met ground water standards. There were exceedances in the ground water standards for TOC, ammonia, chloride, color, cadmium, sodium, zinc, and pH in the downgradient wells.

RECOMMENDATIONS:

Risk of ground water contamination at this facility was rated among the highest in the DEQ Blue Ridge region of 92 impoundments in 1993. Hazardous pollutants are used in manufacturing and may be present in wastewater and sludge. A statistical evaluation of the upgradient and downgradient wells is needed to evaluate whether there is seepage from the lagoons into ground water. If monitoring results indicate that any unit has contaminated the ground water, the permittee shall submit a corrective action plan within 60 days of being notified by the regional office. The plan shall set forth the steps to be taken by the permittee to ensure that the contamination source is eliminated, that the contaminant plume is contained on the permittee's property, or any leakage to surface water does not result in a violation of water quality standards.

Unless discontinued under an approved corrective action plan, ground water monitoring shall continue. The wells have been sampled 30 times since 1992. Given the quantity of ground water monitoring data for MW-6, 7, 8, 9R, 10, 11, 12, 13, and 14; the monitoring frequency shall be reduced from semiannual to annual.

Since lead and chromium were below the ground water standards for all wells monitored, these parameters will no longer be required for the ground watering monitoring. Ammonia, TOC, chloride, color, cadmium, pH, sodium, and zinc will continue to be monitored as per the ground water monitoring plan.

GP, Big Island Groundwater Monitoring Data (VA0003026)

MW-6 (Upgradient from Primary Ponds) 610.23 top of screen 5.67', TOC = 615.73, 10 ' long

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			5.5-8.8	10	0.025	25	15	0.4	50	50	25	50
QL required by GWMP				0.5	0.1	1	10	0.1	1	1	20	5
6	8/5/92	608.25	6.5	6.2	10	5	925	nd	nd	1	7.2	nd
6	11/92	607.20	6.4	5.1	5	13	25	nd	nd	2	6.9	nd
6	2/92	610.60	6.0	8	16	6	671	nd	2	2	6.1	5
6	5/93	612.40	6.6	6.5	1	15	14	3	nd	nd	6.9	14
6	4/95	604.72	6.5	6.1	5.4	21	nd	0.8	1	14	8.1	11
6	10/95	604.70	6.6	4	1.8	15	nd	nd	nd	4	13.3	nd
6	6/5/97	605.71	6.6	2.8	4.6	13	nd	1.5	nd	nd	6.2	13
6	12/9/98	601.13	6.3	1.8	1.7	20	nd	nd	nd	nd	9.0	11
6	6/17/1999	602.40	6.5	4.8	1.5	4	660	<0.1	1J	3	7.8	<5
6	12/9/1999	603.88	6.6	7.6	4.3	20	1200	1.6	5J	2J	11.7	66
6	6/22/2000	604.91	6.4	6.5	1.9	22	1500	0.7J	3B	2	10.4	48
6	12/14/2000	603.65	6.6	4.8	2	19	<25	<0.1	1J	<1	12.0	8
6	6/6/2001	605.15	6.5	3.3	1.2	5	9	<0.4	<1	<2.6	5.5	<1.9
6	12/7/2001	600.43	6.4	4.2	2.5	24	<5	<0.4	<1	<2.6	16.0	<1.9
6	6/20/2002	600.91	6.6	5.8	3.7	21	12	<0.5	<0.7	<1.5	14.2	<1.3
6	12/19/2002	605.03	6.7	4.7	4.1	27	140.6	<0.6	4.1J	<2.2	19.2	< 3.1
6	6/25/2003	614.74	6.5	5.7	4.8	21	<5	<0.5	3J	<2.9	17.2	24
6	12/2/2003	612.46	6.4	4.1	12.3	28	<5.0	0.9J	3.0	<2.9	16.5	15.8
6	6/22/2004	608.93	6.5	7.5	0.008	23	<5.0	<0.5	<1.3	<2.9	23.5	98
6	12/14/2004	612.05	6.5	2.9	4.5	23	<5.0	<0.4	<0.9	<1.4	25.8	231
6	6/22/2005	607.47	6.3	11.3	8.7	19	<1	<0.2	<1.0	<1	12.4	36
6	12/14/2005	609.30	6.7	2.4	2.2	21	<5	<0.2	<1.0	<1.0	13.6	11
6	6/13/2006	605.03	7.0	4.7	0.6	20	<5	<0.2	<1.0	<1.0	14.7	26
6	12/18/2006	609.30	6.5	4.6	5.1	23	<5	<0.2	<1	<1	14.0	<3
6	4/25/2007	612.45	6.8	2.0	3.4	24	37	<1.0	<5	0.15	17.0	33
6	10/25/2007	602.51	6.8	17.0	1.5	20	175	<0.5	<0.4	<4	14.4	18.3
6	4/23/2008	603.73	6.7	12.3	1.4	21	<25	<0.5	<0.4	<4	16.2	16.1
6	10/22/2008	602.58	6.8	26.7	1.7	21	<25.0	<1.0	<5.0	<5.0	166.0	30.8
6	5/18/2009	613.55	6.8	6.9	1.7	17	<25.0	<0.5	<0.4	<4	18.5	<0.4
6	10/27/2009	603.44	7.6	23.9	2.8	16	<25.0	<1.0	<5.0	<5.0	18.1	<10.0

MW-7 (Downgradient from Primary Ponds) 591.17 top of screen 19.67' TOC= 610.77, 10 ' long

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			5.5-8.5	10	0.025	25	15	0.4	50	50	25	50
QL required by GWMP				0.5	0.1	1	10	0.1	1	1	20	5
7	8/5/92	595.18	6.5	4.3	< 1	17	62	0.2	1	nd	43	nd
7	11/92	594.10	6.3	4	1	20	37	nd	nd	2	57	nd
7	2/92	596.50	6.0	9.2	< 1	17	429	0.2	3	2	34	13
7	5/93	597.60	6.3	7.9	< 1	23	28	1.5	nd	2	52	nd
7	4/95	594.31	6.5	3.8	1	22	62	0.1	1	10	58	6
7	10/95	593.96	6.4	3.9	0.8	28	nd	0.3	nd	5	65	nd
7	6/5/97	595.05	6.7	3.9	1.2	26	nd	0.9	nd	nd	75	16
7	12/9/98	592.19	6.3	4.4	1.1	27	nd	0.4	nd	nd	61	22
7	6/17/1999	592.78	6.5	4.9	1.2	20	330	<0.1	<1	<1	77	<5
7	12/9/1999	593.31	6.6	5.5	1.7	34	760	nd	6	1	80	226
7	6/22/2000	593.72	6.6	17.3	0.9	27	1000	0.2	2	1	84	46
7	12/14/2000	593.12	6.5	4.4	0.9	25	<25	<0.1	<1	<1	83	8
7	6/6/2001	594.33	6.5	4.1	1.4	31	4	<0.4	<1	<2.6	91	<1.9
7	12/7/2001	591.83	6.6	4.2	1.3	29	<5	<0.4	<1	<2.6	82	<1.9
7	6/20/2002	592.10	6.7	5.5	3.1	32	16	<0.5	<0.7	<1.5	139	<1.3
7	12/19/2002	594.27	6.7	5.9	1.0	32	11.9	<0.6	3.8	<2.2	132	5.8
7	6/10/2003	599.93	6.5	5.7	1.1	33	<5	<0.5	<1.3	<2.9	90	27.0
7	12/2/2003	597.52	6.5	3.7	0.7	34	<5.0	<0.5	<1.3	<2.9	106	15.0
7	6/22/2004	595.92	6.6	8.5	0.2	37	<5.0	<0.5	2	<2.9	143	240
7	12/14/2004	612.05	6.7	7.1	0.4	37	34.5	1	3	<1.4	156	228
7	6/22/2005	595.13	6.7	7.91	1.02	36.3	5	0.2	<1	<1	133	32
7	12/14/2005	595.19	6.8	5.91	0.86	39.3	5	0.3	<1	<1	114	16
7	6/13/2006	593.89	7.3	7.17	10.7	38.7	<5	<0.2	<1	<1	105	5
7	12/19/2006	595.53	6.8	6.37	0.88	41.5	<5	1	<1	<1	103	6
7	4/25/2007	597.32	6.8	6.5	1.0	42	<20	<1.0	<5.0	<5.0	93	22
7	10/25/2007	592.42	6.8	5.9	1.4	40.2	47	<0.5	<0.4	<4	72	13.2
7	4/24/2008	594.41	6.6	8.8	1.4	42.5	<25	<1.0	<5.0	<5.0	75	21.7
7	10/22/2008	592.42	6.8	42.9	1.1	42.8	<25.0	<1.0	<5.0	<5.0	757	16.9
7	5/18/2009	597.02	6.8	6.2	0.86	34.7	<25.0	<0.50	<0.40	<4.0	79	<0.4
7	10/28/2009	593.49	7.6	12.6	1.9	42.2	<25.0	<1.0	<5.0	<5.0	90	11.5

MW-8 (Downgradient from Primary Ponds) 600.17 top of screen 11.67' TOC=611.75, 10 ' long

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			**5.5-8.5**	**10**	**0.025**	**25**	**15**	**0.4**	**50**	**50**	**25**	**50**
QL required by GWMP				**0.5**	**0.1**	**1**	**10**	**0.1**	**1**	**1**	**20**	**5**
8	8/5/92	594.11	6.6	9.9	< 1	11	12 (1)	0.1	2	nd	**35**	6
8	11/92	594.10	6.2	4.9	< 1	21	**50**	**0.8**	nd	1	**53**	nd
8	2/92	596.40	5.6	8	< 1	7	**57**	**0.4**	2	nd	19	nd
8	5/93	597.40	5.6	4.7	< 1	4	nd	**7.2**	nd	1	11	13
8	4/95	594.28	6.1	2.5	**1.2**	21	nd	0.1	nd	9	**61**	11
8	10/95	593.95	6.5	3.9	**0.4**	24	nd	0.1	nd	4	**62**	nd
8	6/5/97	595.07	6.7	5.6	**1.0**	25	15	**0.7**	nd	nd	**83**	17
8	12/9/98	592.15	6.2	5.3	**0.9**	23	nd	nd	nd	nd	**81**	8
8	6/17/1999	592.57	6.4	4.8	**1.2**	7	**500**	<0.1	<1	<1	**71**	<5
8	12/9/1999	593.27	6.6	5.7	**1.1**	4	**700**	0.2	4	2	**74**	26
8	6/22/2000	593.60	6.5	5.5	**0.6**	22	**1100**	0.1	2	1	**64**	21
8	12/14/2000	592.95	6.5	3.7	**0.6**	15	**42.2**	<0.1	<1	<1	**75**	7
8	6/6/2001	594.27	6.2	1.5	**0.4**	25	<1	<0.4	<1	<2.6	**78**	<1.9
8	12/7/2001	592.45	6.6	5.6	**1.3**	**30**	<5	<0.4	<1	<2.6	**116**	<1.9
8	6/20/2002	592.05	6.6	3.2	**5.2**	**32**	**23**	<0.5	<0.7	<1.5	**144**	<1.3
8	12/19/2002	594.75	6.8	5.9	**1.1**	**33**	**21.5**	<0.6	2.7	<2.2	**145**	8
8	6/10/2003	599.88	6.0	2.8	**1.1**	**33**	<5	<0.5	<1.3	<2.9	11	<1.3
8	12/2/2003	597.48	6.3	2.1	**0.5**	17	<5.0	<0.5	<1.3	<2.9	**56**	13.8
8	6/22/2004	595.90	6.2	3.1	**0.3**	18	6.6	<0.5	<1.3	<2.9	**118**	**89**
8	12/14/2004	597.34	6.6	4.2	**0.9**	**31**	8.4	<0.4	<0.9	<1.4	**107**	**241**
8	6/22/2005	595.08	6.4	6.6	**0.7**	**33**	5	<0.2	<1	<1	**124**	35
8	12/14/2005	595.16	6.9	6.6	**1.1**	**38**	5	<0.2	<1	<1	**104**	15
8	6/13/2006	593.84	7.2	6.3	**1.3**	**36**	<5	<0.2	<0.1	<1	**109**	18
8	12/18/2006	595.52	6.9	4.0	**0.7**	**42**	<5	<0.2	<0.1	<1	**102**	4
8	4/25/2007	597.26	6.8	5.1	**1.7**	**39**	**263**	<1.0	<5.0	<5.0	**71**	21
8	10/25/2007	592.47	6.8	6.3	**1.3**	**42**	**97**	<0.5	<0.4	<4	**71**	15.3
8	4/23/2008	594.26	6.8	**27.9**	**1.4**	**41**	<25	<1.0	<5.0	<5.0	**81**	20.4
8	10/22/2008	592.40	6.8	**38.4**	**1.4**	**44**	<25.0	<1.0	<5.0	<5.0	**822**	10.9
8	5/18/2009	597.02	6.9	**6.1**	**1.6**	**41**	<25.0	<0.50	<0.40	<4.0	**82**	<0.4
8	10/29/2009	593.47	7.6	**15.1**	**1.1**	**42**	<25.0	<1.0	<5.0	<5.0	**91**	55.5

MW-9 (Upgradient from Aeration Basin and Polishing Ponds)
599.57 top of screen 17.67' TOC=617.13, 10 ' long (9R: 617.92 MP Elev., adjacent to access road on northern side of WWTP)

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			**5.5-8.5**	**10**	**0.025**	**25**	**15**	**0.4**	**50**	**50**	**25**	**50**
QL required by GWMP				**0.5**	**0.1**	**1**	**10**	**0.1**	**1**	**1**	**20**	**5**
9	8/5/92	596.52	5.7	2.2	< 1	3	**37**	**2.4**	3	nd	4.4	nd
9	11/92	599.10	**5.4**	2	< 1	7	**50**	**0.7**	nd	nd	4.5	nd
9	2/92	597.80	**5.0**	3.8	< 1		nd	**0.7**	3	nd	3.0	19
9	5/93	599.20	5.5	1.8	< 1	4	nd	nd	nd	1	3.9	10
9	4/95	595.92	6.2	0.7	**0.2**	15	nd	0.2	1	nd	4.2	nd
9	10/95	596.42	**5.0**	0.7	nd	13	nd	0.3	nd	1	3.7	nd
9	6/5/97	597.56	**5.4**	nd	< 1	7	nd	0.4	4	nd	5.3	18
9	12/9/98	595.31	**5.0**	1.1	nd	23	nd	**0.6**	nd	nd	17.0	12
9	6/17/1999	596.39	5.9	1.2	**0.3**	18	**90**	0.4	<1	<1	15.7	<5
9	12/9/1999	597.59	**5.4**	1.4	**0.2**	18	**280**	0.4	3	1	8.8	26
9	6/22/2000	597.45	5.8	1.8	<0.1	17	**340**	0.4	3	1	**26.2**	34
9	12/14/2000	597.10	5.6	1.4	<0.1	16	<25	0.3	1	<1	**54.0**	10
9R	8/8/2001	597.96	**5.4**	<0.9	**0.2**	16.7	<1	<0.5	<0.7	<1.5	12.6	<1.3
9R	12/7/2001	597.67	5.6	1.7	<0.1	21	<5	<0.4	<1	<2.6	14.5	<1.9
9R	6/20/2002	598.06	6.0	<0.4	**1.6**	18	**165**	**1.0**	<0.7	<1.5	**27.2**	<1.3
9R	12/19/2002	591.65	6.2	<1	**0.2**	15.2	**12.3**	**0.7**	2	<2.2	21.8	10.4
9R	6/9/2003	606.37	6.0	1.8	**0.5**	11.7	<5	**0.9**	<1.3	<2.9	10.0	<1.3
9R	12/2/2003	601.59	6.2	<0.5	**0.1**	13.8	<5.0	<0.5	<1.3	<2.9	8.9	13.3
9R	6/22/2004	599.41	5.6	1.2	<0.063	14.3	<5.0	<0.5	<1.3	<2.9	10.5	**188**
9R	12/14/2004	602.37	6.3	1.44	**0.097**	17.7	**58.2**	<0.4	<0.9	<1.4	14.3	**57**
9R	6/22/2005	599.50	5.5	3.75	<0.02	11.1	5	**0.4**	<1	<1	7.0	26
9R	12/14/2005	601.71	5.8	1.63	<0.02	15.7	**50**	**0.8**	<1	<1	8.2	21
9R	6/13/2006	597.60	6.2	2.4	<0.1	13.9	**50**	<0.2	<0.1	<1	8.2	9
9R	12/19/2006	599.83	5.8	1.24	<0.10	16.1	**<5**	0.4	<1	<1	8.8	9
9R	4/25/2007	601.60	5.6	1.2	<0.10	17	<20	0.77	0.32	<5.0	10.0	20
9R	10/25/2007	596.98	5.6	1.0	<.10	15.0	<20	<0.5	<0.4	<4	7.6	13.7
9R	4/23/2008	600.09	5.5	**12.8**	<0.10	15.4	<25	<1.0	<5.0	<5.0	**89.1**	18.6
9R	10/22/2008	597.54	5.5	4.0	<0.10	16.5	<25.0	<1.0	<5.0	<5.0	**85.7**	13
9R	5/18/2009	606.36	6.6	3.1	<0.10	15.5	<25.0	<0.5	<0.40	<4.0	9.9	<0.4
9R	10/24/2009	597.90	7.6	**3.8**	<0.10	14.3	<25.0	<1.0	<5.0	<5.0	12.0	21.2

MW-10 (Downgradient from Polishing Pond) 597.69 top of screen 16.67' TOC= 614.25, 10 ' long

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			5.5-8.5	10	0.025	25	15	0.4	50	50	25	50
QL required by GWMP				0.5	0.1	1	10	0.1	1	1	20	5
10	8/5/92	589.18	6.4	2.3	< 1	11	25	4.4	4	2	18	62
10	11/92	592.20	6.3	4.4	< 1	20	38	0.2	nd	nd	19	10
10	2/92	589.70	6.0	8.5	< 1	20	214	nd	4	nd	15	16
10	5/93	590.20	7.0	11	< 1	24	14	3.3	nd	1	12	nd
10	4/95	589.64	7.0	7	0.6	23	nd	nd	1	9	22	7
10	10/95	589.50	6.5	4.8	0.6	27	nd	nd	nd	2	21	nd
10	6/5/97	592.55	6.9	4.5	0.9	40	nd	1	1	nd	84	9
10	12/9/98	589.26	6.5	6.6	0.8	20	nd	0.3	nd	nd	88	20
10	6/17/1999	589.20	6.7	6.7	0.2	2	580	<0.1	<1	<1	91	<5
10	12/9/1999	590.42	6.6	8.3	1.2	3	280	nd	3	2	105	49
10	6/22/2000	589.85	6.6	61.7	1.1	42	1100	0.3	1	<1	85	15
10	12/14/2000	589.65	6.5	7.7	2.8	35	39.9	<0.1	<1	<1	106	6
10	6/6/2001	590.27	6.4	4.8	0.2	46	<1	<0.4	<1	<2.6	115	<1.9
10	12/7/2001	597.67	6.8	8.7	1.6	51	<5	<0.4	<1	<2.6	148	<1.9
10	6/20/2002	589.10	6.9	8.6	0.4	49	23	<0.5	<0.7	<1.5	117	20
10	12/19/2002	591.65	6.7	7.6	2.8	51	10.5	<0.6	4.9	<2.2	200	<3.1
10	6/10/2003	593.71	6.6	6.9	2.6	54	<5	<0.5	2.5	<2.9	128	<1.3
10	12/2/2003	591.50	6.6	7.6	2.6	61	<5.0	<1.0	<1.3	<2.9	157	21
10	6/22/2004	590.48	6.5	8.3	2.5	51	<5.0	<0.5	<1.3	<2.9	166	122
10	12/14/2004	592.35	6.7	7.0	1.9	52	5.9	<0.4	<0.9	<1.4	192	175
10	6/22/2005	589.84	6.6	8.1	2.0	47	20	0.4	<1	<1	182	30
10	12/14/2005	590.22	6.8	9.3	4.1	49	10	<0.2	<1	<1	164	10
10	6/14/2006	589.43	7.3	9.6	1.1	46	<5	<0.2	<1	<1	155	10
10	12/19/2006	589.88	6.3	6.9	1.7	57	<5	<0.2	<1	<1	149	15
10	4/25/2007	590.78	6.7	8.3	2.2	54	291	<1.0	<5.0	<5.0	100	19
10	10/25/2007	589.32	6.7	2.8	0.6	50	568	<0.5	<.4	<4	47	18.8
10	4/23/2008	596.34	6.6	13.8	1.3	48	<25	<1.0	<5.0	<5.0	82	18.9
10	10/24/2008	588.35	6.6	22.8	0.5	42	<25.0	<1.0	<5.0	<5.0	57	<10
10	5/18/2009	592.86	7.2	18.6	1.6	54	<25.0	<0.5	<0.4	<4.0	181	<0.4
10	10/28/2009	589.40	7.6	12.1	0.9	42	<25.0	<1.0	<5.0	<5.0	158	15.1

MW-11 (Downgradient from Aeration Basin)

602.68 11a-top of screen 15.67' TOC= 619.64, 10 ' long 11b-19.67'; TOC=619.64between aeration and settling ponds

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			5.5-8.5	10	0.025	25	15	0.4	50	50	25	50
QL required by GWMP				0.5	0.1	1	10	0.1	1	1	20	5
11	8/5/92	590.87	6.9	8.1	3	25	312 (1)	0.3	3	nd	95	8
11	11/92	591.80	6.3	5.4	8	40	12	0.3	nd	1	193	nd
11	2/92	591.70	6.1	2.8	4	27	nd	0.5	3	nd	101	23
11	5/93	592.70	6.6	4.6	< 1	32	14	0.6	nd	1	85	nd
11	4/95	591.41	6.9	3.3	0.7	15	nd	0.2	1	17	208	5
11	10/95	591.50	6.5	4.4	1.1	39	14	0.3	nd	10	218	nd
11	6/5/97	594.14	6.8	5.6	1.1	53	17	1.8	1	nd	297	17
11	12/9/98	591.63	6.5	7.8	2.3	43	31	1.5	nd	nd	245	nd
11	6/17/1999	591.33	6.6	8.1	1.9	40	260	0.1	2	<1	299	<5
11	12/9/1999	592.13	6.7	9.1	1.5	49	200	0.2	4	4	264	120
11	6/22/2000	592.38	6.5	10.3	2.2	47	110	0.2	1	1	285	31
11	12/14/2000	592.57	6.7	9.8	3.0	40	<25	0.3	<1	<1	298	<5
11	6/6/2001	593.47	6.7	6.8	3.6	44.6	<1	<0.4	<1	<2.6	273	<1.9
11	12/7/2001	592.81	6.7	8.4	3.1	42.8	<5	<0.4	<1	<2.6	225	<1.9
11	6/20/2002	592.38	6.9	10.0	6.1	48.2	468	1.0	<0.7	<1.5	243	26
11	12/19/2002	595.64	6.9	10.0	2.8	51	48.3	<0.6	4.9	<2.2	200	<3.1
11	6/10/2003	595.83	6.8	11.4	7.9	43	17.2	0.8	3.1	>2.9	348	15.1
11	12/2/2003	594.28	6.8	10.1	8.5	62.8	45.6	<0.5	1.5	<2.9	354	12
11	6/22/2004	593.19	6.6	13.2	13.9	55	7.6	<0.5	<1.3	<2.9	331	202
11	12/14/2004	595.08	6.9	11.8	16.1	60.4	108.2	<0.4	<0.9	<1.4	476	277
11	6/22/2005	592.92	6.9	15.7	22.4	64.1	90	0.4	<1	<1	360	29
11B	12/14/2005	592.92	7.04	17.7	6.51	72.1	10	0.2	<1	<1	309	8
11B	6/13/2006	591.64	7.39	20.8	24.6	59.5	<5	<0.2	<1	<1	351	13
11B	12/19/2006	592.46	6.86	19.7	15.1	61.7	150	0.2	<1	2	326	6
11B	4/25/2007	593.96	7.03	18	46	71	51	0.28	0.64	<5.0	100	23
11B	10/25/2007	591.6	7.04	45.5	53.8	72.8	105	<0.5	<0.4	<4	79.8	21.9
11B	4/24/2008	537.95	7.1	28	49.5	77	95	<1.0	<5.0	<5.0	99.3	24.8
11B	10/24/2008	591.26	7.2	45.6	55.8	83.5	146	8.1	<5.0	<5.0	262	17.4
11B	5/18/2009	595.48	6.42	37.6	53.8	76.9	100	<0.50	<0.40	<4.0	234	<0.4
11B	10/27/2009	592.12	7.1	44.9	63.2	78.2	130	<1.0	<5.0	<5.0	257	17.3

MW-12 (Upgradient from Sludge Lagoons) 603.69 top of screen 10.67'; TOC=614.36, 10 ' long

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			5.5-8.5	10	0.025	25	15	0.4	50	50	25	50
QL required by GWMP				0.5	0.1	1	10	0.1	1	1	20	5
12	8/5/92	603.05	6.8	0.8	< 1	9	12	0.1	nd	3	9	nd
12	11/92	603.40	5.8	0.9	< 1	6	138	0.4		nd	7	15
12	2/92	603.80	5.6	3.3	< 1	14	14	0.1	3	nd	6	20
12	5/93	603.40	6.5	1.8	< 1	15	nd	6.8		1	9	77
12	4/95	598.81	6.7	0.7	0.4	23	nd	nd	nd	5	9	nd
12	10/95	605.25	5.6	0.7	nd	26	nd	nd	nd	1	10	nd
12	6/5/97	605.55	6.4	nd	0.1	14	nd	0.3	nd	nd	11	11
12	12/9/98	603.69	5.5	1.5	nd	28	nd	1.2	nd	nd	20	21
12	6/17/1999	604.44	6.6	1.5	0.4	15	120	0.2	<1	<1	27	<5
12	12/9/1999	605.59	5.9	9.1	0.1	34	180	0.1	3	2	26	55
12	6/22/2000	605.93	7.0	10.7	<.1	37	360	0.1	1	1	24	18
12	12/14/2000	604.81	6.2	0.9	<.1	40	<25	0.2	<1	<1	19	7
12	6/6/2001	604.76	6.1	<.9	<0.1	31.6	7.5	<0.4	<1	<2.6	16	<1.9
12	12/7/2001	605.16	6.2	<.9	<0.1	30	<5	<0.4	<1	<2.6	24	<1.9
12	6/20/2002	605.30	6.3	3.4	0.2	96.5	194	<0.5	<0.7	<1.5	84	<1.3
12	12/19/2002	607.64	6.3	1.1	<14	35.6	31.2	<0.6	<1.3	<2.2	54	<3.1
12	6/10/2003	609.98	6.8	2.1	3.0	60.5	41	1.0	1.5	<2.9	27	12.5
12	12/2/2003	607.52	6.9	<0.5	0.1	13	<5.0	<0.5	<1.3	<2.9	22	10
12	6/22/2004	606.81	6.3	1.2	<0.063	19.3	<5.0	<0.5	<1.3	<2.9	18	43
12	12/14/2004	607.90	6.4	<0.27	<0.063	35.6	<5.0	<0.4	<0.9	<1.4	28	74
12	6/22/2005	606.52	6.4	1.4	0.1	14.3	<1	<0.2	<1	<1	13	16
12	12/14/2005	606.52	6.4	1.0	0.04	33.4	<5	0.2	<1	<1	18	8
12	6/13/2006	606.28	7.1	4.2	<0.1	52.4	<5	<0.2	<0.1	<0.1	26	16
12	12/19/2006	606.88	6.2	0.8	<0.10	47.1	<5	<0.2	<0.1	<0.1	18	16
12	4/26/2007	608.08	6.5	<1.0	<0.002	16	<20	0.034	1.4	<5	13	16
12	11/15/2007	605.82	6.7	9.4	<0.10	14.8	95	<0.5	<0.4	<4	13	11.2
12	4/24/2008	602.67	6.2	9.7	<0.10	25.2	<25	<1.0	<5.0	<5.0	15	21
12	10/24/2008	605.41	5.6	9.6	<0.10	24.1	<25.0	1.2	<5.0	<5.0	16	<10
12	5/18/2009	608.78	7.0	3.2	<0.01	38.7	26	<0.50	<0.40	<4.0	22	<0.4
12	10/29/2009	605.48	7.6	2.8	<0.10	23	<25.0	<1.0	<5.0	<5.0	20	14.6

MW-13 (Downgradient from Sludge Lagoons) 597.69 top of screen 16.67' TOC=611.15, 10 ' long

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			5.5-8.5	10	0.025	25	15	0.4	50	50	25	50
QL required by GWMP				0.5	0.1	1	10	0.1	1	1	20	5
13	8/5/92	598.25	5.7	1.7	< 1	23	12	1.2	1	1	76	nd
13	11/92	598.20	5.6	1.7	< 1	31	12	1.1	nd	1	64	nd
13	2/92	597.90	5.3	1.8	< 1	26	nd	1	2	nd	46	15
13	5/93	598.00	5.8	6.3	< 1	32	nd	5	nd	nd	62	10
13	4/95	594.77	6.0	1.4	0.2	22	nd	0.6	nd	3	70	10
13	10/95	585.70	5.4	1.5	nd	23	nd	0.5	nd	2	71	nd
13	6/5/97	585.79	6.1	1.8	< 1	24	nd	1.6	nd	nd	103	23
13	12/9/98	598.03	5.5	2.6	nd	23	16	4.3	nd	nd	95	19
13	6/17/1999	601.20	6.0	3.3	0.2	15	20	1.0	<1	<1	235	<5
13	12/9/1999	598.57	5.9	3.4	0.1	24	9	2.7	1	2	139	27
13	6/22/2000	598.74	6.1	4.8	<0.1	27	7	2.2	<1	<1	152	10
13	12/14/2000	598.73	6.0	4.8	<0.1	30	<25	2.2	<1	<1	140	15
13	6/6/2001	599.13	5.9	2.8	<0.1	34	<1	3	<1	<2.6	122	<1.9
13	12/7/2001	598.85	6.0	4.5	<0.1	33	<5	<0.4	<1	<2.6	153	30
13	6/20/2002	598.97	6.1	2.8	0.4	38	166	4	<0.7	<1.5	120	22
13	12/19/2002	607.64	6.2	3.4	<0.014	37	21.5	<0.6	<1.3	<2.2	157	<3.1
13	6/10/2003	600.57	6.1	4.9	1.0	34	<5	1.0	1.4	<2.9	148	25
13	12/2/2003	599.71	6.2	2.6	0.2	40	<5.0	4.0	2	<2.9	168	12
13	6/22/2004	599.95	6.0	5.2	<0.063	37	<5.0	28.0	<1.3	<2.9	156	108
13	12/13/2004	600.04	6.1	3.1	0.12	38	6.2	2	<0.9	<1.4	185	438
13	6/22/2005	599.54	6.1	4.0	0.04	35	<1	0.5	<1	<1	149	31
13	12/14/2005	599.54	6.3	4.26	0.04	37.1	<5	1.5	<1	<1	163	16
13	6/14/2006	599.57	6.6	18.9	<0.10	35	<5	<0.2	<1	<1	160	39
13	12/19/2006	599.70	6.2	3.98	0.14	39	<5	0.8	<1	<1	145	11
13	4/25/2007	600.18	6.4	3.3	<0.10	35	<20	7.2	0.76	<0.3	100	30
13	11/15/2007	599.53	6.2	44.8	<0.10	36.8	61	9.1	<0.4	<4	79	37.5
13	4/23/2008	600.26	6.1	12	<0.10	36.6	<25	13.1	<5.0	<5.0	87	23.4
13	10/22/2008	599.41	6.2	29.4	<0.10	38.6	<25.0	13.1	<5.0	<5.0	94	11.8
13	5/19/2009	600.86	6.8	22.6	<0.01	37.2	<25	19.9	<0.40	<0.4	123	<0.4
13	10/28/2009	599.60	7.6	24	<0.10	38.3	<25.0	3.9	<5.0	<5.0	89	12.3

MW-14 (Downgradient from Sludge Lagoons) 595.39 top of screen 15.67' TOC=611.06, 10 ' long

Well	Date	SWE	pH	TOC	NH3	Chloride	Color	Cd	Cr	Pb	Na	Zn
		ft	SU	mg/l	mg/l	mg/l	ADMI CU (2)	ug/l	ug/l	ug/l	mg/l	ug/l
WQS			**5.5-8.5**	**10**	**0.025**	**25**	**15**	**0.4**	**50**	**50**	**25**	**50**
QL required by GWMP				**0.5**	**0.1**	**1**	**10**	**0.1**	**1**	**1**	**20**	**5**
14	8/5/92	598.15	6.0	1.4	< 1	35	12	0.4	nd	2	53	nd
14	11/92	598.20	5.3	2	< 1	36	112	0.8	nd	1	84	6
14	2/92	597.90	5.4	2.3	< 1	30	nd	0.6	2	nd	57	18
14	5/93	598.00	6.1	5.8	< 1	32	14	3.2	nd	1	74	8
14	4/95	598.61	6.0	1.8	0.4	45	nd	1.2	2	8	82	7
14	10/95	599.17	5.7	2	0.7	38	32	1.6	nd	2	83	nd
14	6/5/97	599.34	6.1	2.1	0.4	34	nd	3.5	nd	nd	131	28
14	12/9/98	598.61	5.7	3	0.2	32	nd	1.5	nd	nd	142	23
14	6/17/1999	599.16	6.1	3.5	0.7	25	30	0.2	<1	<1	141	<5
14	12/9/1999	599.31	6.0	3.8	0.8	29	190	0.8	3	3	147	35
14	6/22/2000	599.44	6.3	19.6	0.8	32	250	1.4	2	6	141	45
14	12/14/2000	599.24	6.2	4.6	0.4	30	<25	0.3	<1	<1	130	5
14	6/6/2001	599.61	6.1	3.7	0.9	32	<1	1.0	<1	<2.6	128	<1.9
14	12/7/2001	599.42	6.1	3.8	0.8	34	<5	<0.4	<1	<2.6	145	<1.9
14	6/20/2002	599.41	6.2	2.9	1.0	37	169	6	<0.7	<1.5	121	27
14	12/19/2002	600.11	6.1	3.0	0.7	36	9.0	1.0	< 1.3	<2.2	164	<3.1
14	6/10/2003	601.26	6.1	4.4	1.3	34	<5	<0.5	2.4	<2.9	143	9.3
14	12/2/2003	600.02	6.2	3.2	1.1	36	<5.0	<0.5	<1.3	<2.9	185	165
14	6/22/2004	599.86	5.9	4.7	0.7	37	<5.0	<0.5	<1.3	<2.9	161	98
14	12/13/2004	600.31	6.1	3.2	1.0	38	<5.0	<0.4	<1.3	<1.4	203	392
14	6/22/2005	599.95	6.2	6.7	2.3	35	<1	<0.2	<1	<1	162	44
14	12/14/2005	600.61	6.4	5.8	0.97	40.1	<5	0.40	<1	<1	183	10
14	6/13/2006	599.79	6.8	7.0	1.23	37.3	50	<0.2	<1	<1	185	18
14	12/19/2006	600.04	6.3	7.1	1.75	41.9	<5	0.20	<1	<1	179	20
14	4/25/2007	600.48	6.4	5.3	1.0	40	103	0.71	0.61	<5.0	100	25
14	10/25/2007	599.54	6.3	34.0	1.1	39.8	47	<0.5	<0.4	<4	82	25.5
14	4/24/2008	600.51	6.1	13.7	1.1	41.1	<25	<1.0	<5.0	<5.0	94	37.7
14	10/24/2008	599.77	6.2	5.0	1.2	41.8	<25.0	1.4	<5.0	<5.0	146	30.5
14	5/19/2009	601.13	6.5	28.2	1.4	40	<25	<.5	<0.40	<4.0	156	10.6
14	10/28/2009	599.9	7.6	24.4	1.4	41.3	<25.0	<1.0	<5.0	<5.0	162	14.4

SM-1 (Reed Creek, approximately 25 ft upstream of convergence with James River)

Well	Date	pH	TOC	Chloride	Na
		SU	mg/l	mg/l	mg/l
WQS		**5.5-8.5**	**10**	**25**	**25**
QL required by GWMP			**0.5**	**1**	**20**
1	06/17/99	8.0	2.4	2	2
1	12/09/99	8.3	1.6	4	9
1	06/27/00	7.4	2.8	4	3

SM-2 (Reed Creek, approximately 10 ft downstream of RR treacle adjacent to Rt. 501)

Well	Date	pH	TOC	Chloride	Na
		SU	mg/l	mg/l	mg/l
WQS		**5.5-8.5**	**10**	**25**	**25**
QL required by GWMP			**0.5**	**1**	**20**
2	06/17/99	8.4	2.8	2	2
2	12/09/99	6.7	1.6	3	5
2	06/27/00	7.7	2.5	5	3

SM-3 (Long Branch Creek, approximately 25 ft upstream of the convergence with James River)

Well	Date	pH	TOC	Chloride	Na
		SU	mg/l	mg/l	mg/l
WQS		**5.5-8.5**	**10**	**25**	**25**
QL required by GWMP			**0.5**	**1**	**20**
3	06/17/99	7.9	2.3	2	2
3	12/09/99	6.8	1.0	2	3
3	06/27/00	7.8	1.6	2	2

SM-4 (Long Branch Creek, at the site fence line and creek bend downstream of the RR tracks adjacent to Rt. 501)

Well	Date	pH	TOC	Chloride	Na
		SU	mg/l	mg/l	mg/l
WQS		**5.5-8.5**	**10**	**25**	**25**
QL required by GWMP			**0.5**	**1**	**20**
4	06/17/99	8.2	2.3	1	2
4	12/09/99	7.7	1.0	2	2
4	06/27/00	7.8	1.6	2	2

Notes:

(1) Denotes that sample was filtered prior to analysis, all metals are dissolved
underlined parameters are criteria
Bold elevation indicates that groundwater was above the top of the screen at sampling
(2) Data beginning 12/14/00 completed by SM 2120 E(4) rather than 2120B
Bold data indicates values about water quality standards

Estimated elevation of polishing pond bottom:

610	road elevation from SW maps
-2.5	distance from road to water
-6.5	depth given in SMP
601	**estimated elevation of pond bottom**

Estimated elevation of primary pond bottom:

620	berm elevation from SW maps
-2.5	distance from berm to water
-10.5	depth given in SMP
607	**estimated elevation of pond bottom**

Estimated elevation of sludge pond bottom:

track side basin

605.4	water level from 9-14-94 GWM report fromOlver
-3	depth
602.4	**estimated elevation of pond bottom**

river side basin:

607.7	water level from 9-14-94 GWM report from Olver
-6	depth
601.7	**estimated elevation of pond bottom**

PREPARED FOR:
GEORGIA-PACIFIC CORPORATION
HIGHWAY 501 NORTH
P.O. BOX 40
BIG ISLAND, VIRGINIA 24526
804-299-5911

GEORGIA-PACIFIC CORPORATION
WASTEWATER TREATMENT FACILITIES
BEDFORD COUNTY, VIRGINIA
VPDES PERMIT NO. 0003026

GROUNDWATER MONITORING PROGRAM

PATRICK MOORE
ENVIRONMENTAL MANAGER

ORIGINAL SUBMITTAL 2/28/90

REVISION 1: 8/23/91

REVISION 2: 3/2/94

REVISION 3: 11/29/01

REVISION 3
PREPARED BY:

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Georgia-Pacific Corporation
Waste Water Treatment Plant, VPDES Permit No. 0003026
Groundwater Monitoring Plan
Table of Contents

DRAWINGS

EXHIBITS

I. INTRODUCTION AND PURPOSE

The purpose of this program is to determine if activities at the site are in compliance with the Virginia Department of Environmental Quality's (DEQ) Water Quality standards (9VAC25-260-190) pertaining to Groundwater Standards.

This program when approved by the West Central Regional Office of the DEQ shall become an enforceable condition of VPDES Permit No. 0003026 (reissued June 2000).

When the mill's wastewater treatment system was constructed in 1976-77 Wiley and Wilson, Consulting Engineers of Lynchburg, Virginia designed the Aeration and Final Settling Basins. Wiley and Wilson subcontracted Sayre and Sutherland, Inc. of Richmond, Virginia to perform a Geotechnical Study of the area and designed the dikes and bottoms based on that study.

The dikes are 12' wide at the top with a graveled roadway. Sides of the dikes have a 2 ½ to 1 slope. Dikes are constructed of compacted clay soil having dikes suitale low permeability, compacted to 95% (per standard Proctor ASTM D698).

The basin bottoms were sealed with similarly compacted clay soils to a 90% minimum (per standard Proctor ASTM D698).

Rip-rap and vegetation was strategically placed to provide protection from erosion, mechanical aerator action, etc. (A copy of the specifications is attached as Exhibit 1.)

When the Primary Equalization Basins were constructed in 1978 G-P (then Owens-Illinois) contracted Sayre and Associates of Richmond, VA to conduct a Geotechnical Study of that area. Mill engineers designed and built the primary equalization basins based on the Geotechnical Study results and with the same specifications used for the Aeration-Polishing Basins.

Again in 1979 when the Sludge Dewatering Basins were constructed geotechnical data provided by Sayre and Sutherland was used along with the same construction specifications as used for the Aeration & Polishing Basins.

II. THE PROGRAM

Initial assessments and continuing monitoring for each treatment area will be as follows: (A layout of wastewater treatment system is displayed on Drawing 1.)

1.0 Primary Equalization Basins:

1.1 Three monitoring wells (MW-6, MW-7, and MW-8) monitor the uppermost water bearing zone (WBZ) beneath the equalization basin, one upgradient (MW-6) for background ground water quality and two downgradient (MW-7 and MW-8) to detect any potential contaminant releases (see Drawing 1). Monitoring well boring logs and construction information are displayed in Exhibit 2. Semi-annual monitoring events are conducted to monitor water quality within the WBZ beneath the Primary Equalization Basins. Each well is tested for the following:

1. Water level
2. pH

3. Conductivity
4. Soluble Sodium
5. Chloride
6. TOC
7. Soluble Cadmium
8. Soluble Chromium
9. Soluble Lead
10. Soluble Zinc
11. Ammonia
12. Color

Metal analyses will be performed on groundwater samples that have been field filtered using a 0.45-micron filter. The method numbers and parameters are listed in Exhibit 3. After monitoring for 1 year, modifications to the parameter list may be requested by Georgia-Pacific and considered by the DEQ.

2.0 Aeration Basin and Final Settling Basin:

(These 2 basins are to be evaluated together as they share common dikes).

2.1 In accordance with Fact Sheet (#10) for the VPDES permit reissued on June 29, 2000, surface water monitoring for Reed Creek and Long Branch are no longer required.

2.2 Three monitoring wells MW-9R, MW-10, and MW-11 monitor the WBZ beneath the aeration basin and final settling basin, one upgradient (MW-9R) for background groundwater quality and two downgradient (MW-10 and MW-11) to detect any potential contaminant releases (see Drawing 1). Monitoring well boring logs and construction information are displayed in Exhibit 2. Semi-annual monitoring events are conducted to monitor the water quality of the WBZ beneath the aeration and final settling basins. Each well shall be tested for the following:

1. Water level
2. pH
3. Conductivity
4. Soluble Sodium
5. Chloride
6. TOC
7. Soluble Cadmium
8. Soluble Chromium
9. Soluble Lead
10. Soluble Zinc
11. Ammonia
12. Color

Metal analyses will be performed on groundwater samples that have been field filtered using a 0.45-micron filter. The method numbers and parameters are listed in Exhibit 3. After monitoring for 1 year modifications to the parameter list may be requested by Georgia-Pacific and considered by the DEQ.

3.0 Sludge Lagoons:

3.1 In accordance with Fact Sheet (#10) for the VPDES permit reissued on June 29, 2000, surface water monitoring of Cabin Creek is no longer required.

3.2 Three monitoring wells MW-12, MW-13, and MW-14 monitor the WBZ beneath the sludge dewatering basins, one upgradient (MW-12) for background ground water quality and two downgradient (MW-13 and MW-14) to detect any potential contaminant releases (see Drawing 1). Monitoring well boring logs and construction information are displayed in Exhibit 2. Semi-annual monitoring events are conducted to monitor the water quality of the WBZ beneath the Sludge Lagoons. Each well shall be tested for the following:

1. Water level
2. pH
3. Conductivity
4. Soluble Sodium
5. Chloride
6. TOC
7. Soluble Cadmium
8. Soluble Chromium
9. Soluble Lead

10. Soluble Zinc

11. Ammonia

12. Color

Metal analyses will be performed on groundwater samples that have been field filtered using a 0.45-micron filter. The method numbers and parameters are listed in Exhibit 3. After monitoring for 1 year modifications to the parameter list may be requested by Georgia-Pacific and considered by the DEQ.

III. REPORTING

Semi-annual reporting of groundwater monitoring events will be submitted to the West Central Regional Office of the DEQ with the monthly DMR within 60 days after the calendar quarter collected. The report will include static water elevations of monitoring wells.

IV. SCHEDULE FOR MONITORING WELL INSTALLATION

1. Future groundwater monitoring wells shall be installed and developed within three (3) months of approval by the DEQ. A well completion report documenting the well design and construction will be submitted within 45 days of installation. The West Central Regional Office of the DEQ will be notified 5 days prior to the date of the well installation.
2. Groundwater monitoring shall commence within 45 days of the installation of the groundwater monitoring wells.

EXHIBIT 3

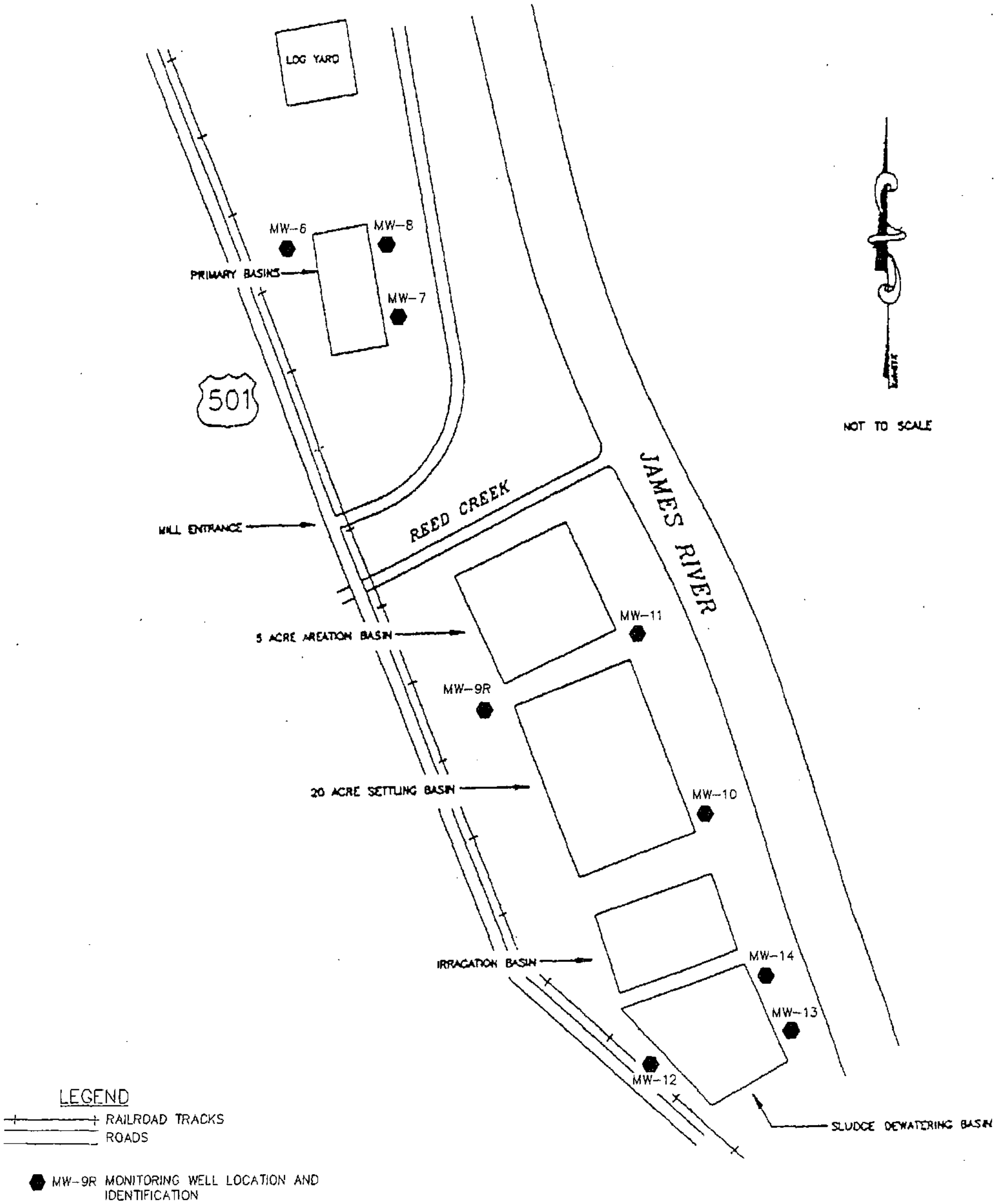
ATTACHMENT C

PARAMETER LIST
GEORGIA-PACIFIC CORPORATION
WWTP LAGOONS, VPDES Permit No. 0003026

Analyte	SW-846 Method	MDL, µg/L	PQL, µg/L
pH (Field, 4 determinations)	9040	(a)	(a)
Conductivity (Field, 4 determinations)	9050	(b)	(b)
TOC (Single determination)	9060	500	2500
Chloride	9252	1000	5000
Color(e)	110.1(c)	1 Units	N/A
Ammonia	4500 (d)	200	1000
Soluble Cadmium	7131	0.1	1
Soluble Chromium	7191	1	10
Soluble Lead	7421	1	10
Soluble Sodium	6010	10	50
Soluble Zinc	6010	5	50

[a]pH will be measured to the nearest 0.01 Standard Unit.
[b]Conductivity will be measured to the nearest 10µmhos/cm.
[c]Methods for the Chemical Analysis of Water and Wastes, USEPA, March 1983.
[d]Standard Methods for the Examination of Water and Wastewater, 17th Edition.
[e]Color results will be reported in ADMI units.
MDL = Mean Detection Limit.
PQL = Practical Quantitation Limit.
N/A = Not Available.

January 11, 1994
Revised October 15, 2001



7/9/01	JOYCE ENGINEERING, INC. 4808 RADFORD AVENUE RICHMOND, VA 23230-3506 PHONE: (804) 355-4520 © 2001 Joyce Engineering, Inc. All rights reserved	SCALE N.T.S.	PROJECT NO. 395.15	SITE PLAN DRAWING #1 GEORGIA-PACIFIC CORP. BIG ISLAND, VA WASTE WATER TREATMENT FACILITY

N:\DWGS\GeorgiaP\BIG ISLAND\SITE2.dwg Layout1

Attachment G

Outfall Data

- **Storm Water Data**

<u>Outfall 001</u>

- **Effluent pH, Temperature, and Hardness Data**

<u>Outfall 002</u>

- **Effluent pH, Temperature, and Hardness Data**

<u>Outfall 003</u>

- **Effluent pH, Temperature, and Hardness Data**
- ***E. coli* Data**
- **Water Quality Standards Monitoring Data**

Storm Water Data

Outfall 012
(sw drainage from parking lot, roadway drains, sediment trap from OCC pad)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	NO_2/NO_3 (mg/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**30**	**120**	**100**	**1.76**	**6.0 - 9.0**	**3.26**	**1.5**	**-**	**15**
5/7/2006	15.2	--	**179**	<0.50	7.12				
4/26/2007	18		**202**	0.79					
6/3/2007	6		**124**						
3/19/2008	5		33		6.78				
5/8/2008				<0.10					
3/13/2009	15		**127**	0.78	7.5				
10/14/2009 c	6	38.6	**152**	0.581		2.68	**2.10**	0.07	
10/14/2009	7	87.8	**397**	1.03	6.53	**3.68**	**2.65**	0.12	<5.00

Outfall 014
(sw runoff from truck scale area, parking area, and main road)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	NO_2/NO_3 (mg/L)	Diss. Cu (ug/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**30**	**120**	**100**	**1.76**	**18**	**6.0 - 9.0**	**3.26**	**1.5**	**-**	**15**
11/16/2005		--		--	<10.4					
3/14/2006					<10.4					
4/7/2006					<10.4					
5/7/2006	7.7		42			7.49				
8/8/2006					15					
10/17/2006	<5		**334**		<10.4	8.62				
2/13/2007					<10.4					
4/26/2007			63		15	7.88				
7/16/2007					<10					
10/24/2007	8		**200**		<10	8.05				
11/26/2007			86							
12/15/2007	<5									
2/1/2008					<10					
4/26/2008					<10					
8/27/2008					5					
10/25/2008			50		**33**	7.98				
11/24/2008	**32**									
2/11/2009					<10					
5/3/2009					16					
8/5/2009					<10					
10/14/2009 c	14	**227**	**486**	0.798			2.35	**1.55**	0.17	
10/14/2009	21	**292**	**360**	1.04	**56**	6.83	3.20	**2.16**	0.23	7.90

Outfall 015
(sw runoff from linerboard roof and around linerboard facility)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	NO_2/NO_3 (mg/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**30**	**120**	**100**	**1.76**	**6.0 - 9.0**	**3.26**	**1.5**	**-**	**15**
5/7/2006	<5								
6/3/2007	6								
3/19/2008	<5								
3/25/2009	21								
10/14/2009 c	<6	20.7	25.9	0.615		1.95	1.33	0.14	
10/14/2009	<7	<20	31.5	<0.05	6.51	1.6	**1.6**	<0.05	<5.00

Outfall 017
(sw runoff from equalization basin area and main access road)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	Diss. Cu (ug/L)	NO_2/NO_3 (mg/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**30**	**120**	**100**	**18**	**1.76**	**6.0-9.0**	**3.26**	**1.5**	**-**	**15**
9/26/2005				<10.4						
11/16/2005				<10.4						
3/25/2006				<10.4						
4/7/2006				<10.4						
5/7/2006	<5		91							
8/15/2006			9							
10/17/2006	<5		**355**	<10.4						
2/13/2007				<10.4						
4/26/2007				<10.4						
6/3/2007			44							
7/16/2007				12						
11/26/2007			**130**	<10.4						
12/15/2007	<5									
7/16/2007				12						
11/26/2007			**130**	<10						
12/15/2007	<5		86							
2/1/2008				<10						
4/26/2008				<10						
8/27/2008				6						
10/17/2008	4		36	<10						
2/11/2009				<10						
5/3/2009				<10						
8/5/2009				<10						
11/18/2009 c	6	112	**399**		0.714		2.38	**1.67**	0.18	
11/18/2009	7	**154**	**405**		0.657	7.07	**3.45**	**2.79**	0.19	<5.00

Outfall 018
(sw runof from between equalization basins and main entrance)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	NO_2/NO_3 (mg/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**30**	**120**	**100**	**1.76**	**6.0-9.0**	**3.26**	**1.5**	**-**	**15**
5/7/2006			85		7.55				
10/17/2006			77		8.37				
11/26/2007			32		7.56				
11/24/2008			75		7.75				
10/14/2009 c	6	88.8	**278**	0.817		2.42	**1.60**	0.17	
10/14/2009	9		**705**	0.763	6.35	**5.63**	**4.87**	0.33	<5.00

Outfall 021
(sw drainage from truck and rail unloading area, outdoor secondary fiber storage area, and 1,000 gallon propane tank)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	NO_2/NO_3 (mg/L)	Diss. Zn (ug/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**30**	**120**	**100**	**1.76**	**120**	**6.0-9.0**	**3.26**	**1.5**	**-**	
9/26/2005		--		--	**258**	--				
11/16/2005		--		--	184	--	1.95	1.33		
3/25/2006					103				0.14	
4/7/2006					97					
5/7/2006	13.4		74			7.16				
8/31/2006					<92					
10/17/2006	**39**		**236**		<92	7.79				
2/13/2007					63					
4/26/2007					16					
7/16/2007					68					
10/24/2007					47					
12/15/2007	5		32			7.1				
2/1/2008					76					
4/26/2008					36					
8/27/2008					37					
10/17/2008	14		29		31	6.93				
11/25/2008			50			7.98				
2/11/2009					22					
5/3/2009					**159**					
8/23/2009					43					
10/14/2009 c	11	58.8	26.7	0.0620			2.47	**2.41**	0.14	
10/14/2009	11	56.4	23.8	0.560	10	7.39	0.89	0.83	0.07	<5.00

Outfall 555
(generated from samples take l,mmgr
(outfall 009 drains sw from roadway drainage)
(outfall 007 drains sw from loading and unloading areas for rail and trucks)
(outfall 010 drains sw from parking lot and main entrance road)
(outfall 013 drains sw from roadway, old truck scales, and parking lot)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	NO2/NO_3 (mg/L)	Diss. Cu (ug/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**30**	**120**	**100**	**1.76**	**18**	**6.0-9.0**	**3.26**	**1.5**	**-**	**15**
8/9/2005	22		**152**		<10.4	7.98				
11/16/2005					<10.4					
3/14/2006					11.9					
8/15/2006					<10.4					
10/17/2006	<5		62		<10.4	8.38	2.42	**1.6**	0.17	
2/13/2007					<10.4					
4/26/2007					11					
7/16/2007 (009)					<10					
10/24/2007 (013)	6		78		<10.4	8.1				
11/26/2007 (013)	9		57							
2/1/2008					<10					
4/26/2008					<10					
8/27/2008					7					
10/25/2008			22		11	7.36				
11/24/2008	12									
2/11/2009 (007)					<10					
5/3/2009 (009)					<10					
8/5/2009 (010)					<10					
10/14/2009 (010) c	<6	47.6	**124**	0.721			2.27	**1.55**	0.07	
10/14/2009 (010)	7	86.3	**199**	0.847		6.48	2.45	**1.60**	0.10	<5.00

Outfall 022
(sw outfall from sediment basin at Amherst landfill)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	NO_2/NO_3 (mg/L)	pH (S.U.)	Total Recoverable Iron (mg/L)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**30**	**120**	**100**	**1.76**	**6.0-9.0**	**1.0**	**3.26**	**1.5**	**-**	**15**
6/21/2005		25	59	0.5	6.88					
5/7/2006			41	<0.5		**0.847**				
5/3/2007			23	0.38		**2.4**				
3/4/2008	<6		10	0.2		**2.98**				
3/14/2009			16	**7.94**		**6.76**				
10/14/2009 c	<6	29.6	48.7	<0.0500			0.77	0.77	0.18	
10/14/2009	<7	45.5	59.4	<0.0500	6.93		1.60	**1.60**	0.22	<5.00

Outfall 023
(sw drainage from haul road near Amherst landfill entrance)

Sample Date	BOD_5 (mg/L)	COD (mg/L)	TSS (mg/L)	NO_2/NO_3 (mg/L)	pH (S.U.)	Total Recoverable Iron (mg/L)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**9**	**120**	**100**	**1.76**	**6.0-9.0**	1.0	**3.26**	**1.5**	**-**	**15**
6/21/2005		**147**	**145**	ND	7.17					
5/7/2006		**9**	**313**	<0.5		**11.4**				
5/17/2007		**150**	34	0.19		**3.7**				
3/19/2008		<10	67	0.1		**8.21**				
3/14/2009		68	**428**	0.99		**8.38**				
6/11/2009			12							
11/18/2009 c	6	57.0	82.2	0.493			**3.83**	**1.67**	0.67	
11/18/2009	8	87.6	78.9	0.875		**6.90**	**4.79**	**3.91**	0.74	<5.00

Outfall 025
(sw runoff from lowest point on Amherst landfill haul road)

Sample Date	TSS (mg/L)	Total Recoverablel ron (mg/L)	BOD_5 (mg/L)	COD (mg/L)	NO_2/NO_3 (mg/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**100**	1.0	**30**	**120**	**1.76**	**6.0-9.0**	**3.26**	**1.5**	**-**	**15**
5/7/2006	47	**2.22**								
5/17/2007	**240**	**1.9**								
3/4/2008	76	**1.56**								
3/14/2009	34	**1.14**								
10/14/2009 c	39.0		<6	27.3	<0.0500		2.41	**2.41**	0.09	
10/14/2009	35.6		<7	27.3	<0.0500	7.10	2.65	**2.65**	0.08	<5.00

Outfall 026
(sw outfall from sw basin at closed Bedford landfill)

Sample Date	TSS (mg/L)	Total Iron (mg/L)	pH (S.U.)	BOD_5 (mg/L)	COD (mg/L)	NO_2/NO_3 (mg/L)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**100**	1.0	**6.0-9.0**	**30**	**120**	1.76	**3.26**	**1.5**	**-**	**15**
6/21/2005	42		6.98							
5/7/2006	9	0.532								
5/3/2007	6.3	**3.0**								
5/8/2008	9	0.5	9							
3/14/2009	7	0.36								
10/14/2009 c	5.70			<6	31.8	<0.0500	1.05	1.05	<0.0500	
10/14/2009	14		6.88	<6	29.6	<0.0500	1.60	**1.60**	0.05	<5.00

Outfall 028

(sw from sw basin receiving runoff from Phase III cells of Amherst landfill)

Sample Date	TSS (mg/L)	Total Recoverable Iron (mg/L)	BOD_5 (mg/L)	COD (mg/L)	NO_2/NO_3 (mg/L)	pH (S.U.)	Total N (mg/L)	TKN (mg/L)	Total P (mg/L)	Oil & Grease (mg/L)
Screening Criteria	**100**	**1.0**	**30**	**120**	**1.76**	**6.0-9.0**	**3.26**	**1.5**	**-**	**15**
5/7/2006	50	<0.40								
5/3/2007	10	**21.5**								
6/3/2007		**22.0**								
3/4/2008	14	**9.10**								
3/14/2009	35	**17**								
10/14/2009 c	41.2		<6	36.2	<0.0500		1.33	1.33	<0.0500	
10/14/2009	31.5		<7	<20	<0.0500	6.72	1.60	**1.60**	<0.0500	<5.00

Outfall 001

GP Big Island
VA0003026

Effluent Hardness (Composite Sampling) (Outfall 001)

Date	mg/L as $CaCO_3$
9/00	176
9/01	160
8/02	164
8/03	132
8/04	136
Mean	154

Effluent hardness data from toxicity testing.

GP Big Island
VA0003026

Effluent Temperature -- Outfall 001

Date Due	^{o}C
10-Jan-07	21
10-Feb-07	20
10-Mar-07	18.3
10-Apr-07	23
10-May-07	28
10-Jun-07	27
10-Jul-07	30
10-Aug-07	31
10-Sep-07	29.4
10-Oct-07	34
10-Nov-07	35
10-Dec-07	23
10-Jan-08	24
10-Feb-08	19.7
10-Mar-08	20.7
10-Apr-08	23
10-May-08	27
10-Jun-08	26.9
10-Jul-08	32
10-Aug-08	32
10-Sep-08	31
10-Oct-08	33
10-Nov-08	34
10-Dec-08	26
10-Jan-09	19
10-Feb-09	18
10-Mar-09	20
10-Apr-09	25
10-May-09	27
10-Jun-09	26
10-Jul-09	28
10-Aug-09	34
10-Sep-09	30
10-Oct-09	27
10-Nov-09	25
10-Dec-09	21

90th Percentile Temperature	34 ^{o}C
90th Percentile Temperature (January - May)	27 ^{o}C

GP Big Island
VA0003026

Effluent pH (S.U.) -- Outfall 001

Date Due	min	max
10-Jan-07	7.1	8.1
10-Feb-07	7	7.7
10-Mar-07	7.2	7.7
10-Apr-07	6.7	7.7
10-May-07	6.9	7.9
10-Jun-07	7.5	8.2
10-Jul-07	6.8	7.9
10-Aug-07	7.5	8.1
10-Sep-07	7.6	8.2
10-Oct-07	7.7	8.3
10-Nov-07	7.6	8.3
10-Dec-07	7.6	7.9
10-Jan-08	7.1	8.3
10-Feb-08	6.8	8.2
10-Mar-08	7.3	8.2
10-Apr-08	7	8.1
10-May-08	7.1	7.6
10-Jun-08	7.1	7.9
10-Jul-08	7.6	7.9
10-Aug-08	7.7	8.3
10-Sep-08	7.7	8.4
10-Oct-08	7.7	8.5
10-Nov-08	8.1	8.7
10-Dec-08	7.9	8.3
10-Jan-09	7.3	8.1
10-Feb-09	7.2	7.9
10-Mar-09	7.1	8
10-Apr-09	7	8
10-May-09	6.9	7.5
10-Jun-09	7	8.2
10-Jul-09	7	8.3
10-Aug-09	7.3	8.1
10-Sep-09	7.6	8.1
10-Oct-09	8	8.3
10-Nov-09	7.6	8.2
10-Dec-09	7.1	7.7

90th Percentile pH	8.3	S.U.
10th Percentile pH	6.9	S.U.

Outfall 002

GP Big Island
VA0003026

Effluent Temperature -- Outfall 002

Date Due	^{o}C
10-Jan-07	20
10-Feb-07	18
10-Mar-07	16.3
10-Apr-07	23
10-May-07	29
10-Jun-07	31
10-Jul-07	33
10-Aug-07	35
10-Sep-07	34
10-Oct-07	36
10-Nov-07	40
10-Dec-07	26
10-Jan-08	21
10-Feb-08	20
10-Mar-08	23
10-Apr-08	24
10-May-08	27
10-Jun-08	32.5
10-Jul-08	34
10-Aug-08	40
10-Sep-08	41
10-Oct-08	31
10-Nov-08	28
10-Dec-08	25
10-Jan-09	16
10-Feb-09	16
10-Mar-09	19
10-Apr-09	24
10-May-09	24
10-Jun-09	27
10-Jul-09	30
10-Aug-09	32
10-Sep-09	31
10-Oct-09	31
10-Nov-09	24
10-Dec-09	21

90th Percentile Temperature	36 ^{o}C
90th Percentile Temperature (January - May)	30 ^{o}C

GP Big Island
VA0025020

Hardness Composite -- Outfall 002

Date	mg/L as $CaCO_3$
07/25/05	122
07/27/05	125
07/29/05	123
08/14/06	169
08/16/06	161
08/18/06	163
04/23/07	56
04/24/07	60
04/25/07	56
04/27/07	88
04/21/08	96
04/22/08	84
04/24/08	68
05/19/09	52
05/20/09	56
05/22/09	64
Mean	96

GP Big Island
VA0003026

Effluent pH (S.U.) -- Outfall 002

Date Due	min	max
10-Jan-07	7.3	7.8
10-Feb-07	7.1	7.8
10-Mar-07	7.4	8.2
10-Apr-07	6.8	8.2
10-May-07	7	8
10-Jun-07	7.7	8.4
10-Jul-07	7.5	8.1
10-Aug-07	7.8	8.4
10-Sep-07	8	8.3
10-Oct-07	8.1	8.4
10-Nov-07	7.7	8.5
10-Dec-07	7.7	8.2
10-Jan-08	7.3	8.4
10-Feb-08	7.4	8.3
10-Mar-08	7.4	8.1
10-Apr-08	7.3	8.2
10-May-08	7.1	7.9
10-Jun-08	7.4	8.3
10-Jul-08	7.7	8.1
10-Aug-08	7.8	8.3
10-Sep-08	7.9	8.4
10-Oct-08	7.5	8.2
10-Nov-08	8	8.7
10-Dec-08	8	8.4
10-Jan-09	7.3	8.1
10-Feb-09	7.3	8.1
10-Mar-09	7.5	8.5
10-Apr-09	7	8.2
10-May-09	7	7.6
10-Jun-09	6.9	8.1
10-Jul-09	6.9	8.2
10-Aug-09	7.6	8.6
10-Sep-09	7.7	8.1
10-Oct-09	7.9	8.4
10-Nov-09	7.6	8.7
10-Dec-09	6.8	7.7

90th Percentile pH	8.5	S.U.
10th Percentile pH	7.0	S.U.

GP Big Island
VA0025020

Hardness Composite -- Outfall 002

Date	mg/L as $CaCO_3$
07/25/05	122
07/27/05	125
07/29/05	123
08/14/06	169
08/16/06	161
08/18/06	163
04/23/07	56
04/24/07	60
04/25/07	56
04/27/07	88
04/21/08	96
04/22/08	84
04/24/08	68
05/19/09	52
05/20/09	56
05/22/09	64
Mean	96

Outfall 003

Date:	Flow, MGD	Ammonia mg/L	Ammonia kg/day
5/3/2009	7.59	1.57	45.10
5/10/2009	7.60	1.66	47.75
5/25/2009	7.97	0.44	13.27
6/7/2009	8.96	0.39	13.23
6/21/2009	8.80	0.37	12.32
6/28/2009	8.29	0.6	18.83
7/12/2009	8.42	0.18	5.74
7/26/2009	8.71	0.38	12.53
8/2/2009	8.12	0.5	15.37
8/16/2009	8.76	0.6	19.89
8/30/2009	7.59	0.86	24.71
10/4/2009	8.52	0.42	13.54
10/18/2009	9.66	0.14	5.12
10/27/2009	8.32	0.24	7.56

Outfall 003
VA0003026

GP Big Island
VA0003026

Effluent pH (S.U.) -- Outfall 003

Date Due	min	max
10-Jan-07	7.7	8.3
10-Feb-07	7.7	8.1
10-Mar-07	6.8	8.3
10-Apr-07	7.6	8.1
10-May-07	7.7	8
10-Jun-07	7.6	8
10-Jul-07	7.4	7.9
10-Aug-07	7.4	7.9
10-Sep-07	7.6	8
10-Oct-07	7.6	7.9
10-Nov-07	7.7	8
10-Dec-07	7.8	8.8
10-Jan-08	7.7	8
10-Feb-08	7.8	8.1
10-Mar-08	7.7	8.2
10-Apr-08	7.8	8.7
10-May-08	7.7	8
10-Jun-08	7.6	8.1
10-Jul-08	7.8	8.1
10-Aug-08	7.8	8.4
10-Sep-08	7.7	8.2
10-Oct-08	7.8	8.2
10-Nov-08	7.7	8.5
10-Dec-08	7.1	8.3
10-Jan-09	7.2	8.1
10-Feb-09	7.5	8.2
10-Mar-09	7.1	8.2
10-Apr-09	7.1	8.1
10-May-09	7.4	8
10-Jun-09	7.5	8.1
10-Jul-09	7.6	8
10-Aug-09	7.4	7.9
10-Sep-09	7.4	7.8
10-Oct-09	7.6	7.9
10-Nov-09	7.5	8.3
10-Dec-09	7.4	8

90th Percentile pH	8.4	S.U.
10th Percentile pH	7.2	S.U.

GP Big Island
VA0003026

Effluent Temperature -- Outfall 003

Date Due	^{o}C
10-Jan-07	19
10-Feb-07	18
10-Mar-07	15.5
10-Apr-07	22
10-May-07	23
10-Jun-07	27
10-Jul-07	28
10-Aug-07	29
10-Sep-07	30.6
10-Oct-07	29
10-Nov-07	27
10-Dec-07	19
10-Jan-08	18
10-Feb-08	17
10-Mar-08	17
10-Apr-08	18
10-May-08	23
10-Jun-08	26
10-Jul-08	30
10-Aug-08	39
10-Sep-08	28
10-Oct-08	27
10-Nov-08	25
10-Dec-08	20
10-Jan-09	19
10-Feb-09	14
10-Mar-09	16
10-Apr-09	18
10-May-09	23
10-Jun-09	26
10-Jul-09	28
10-Aug-09	29
10-Sep-09	31
10-Oct-09	30
10-Nov-09	24
10-Dec-09	22

90th Percentile Temperature	30 ^{o}C
90th Percentile Temperature (January - May)	26 ^{o}C

GP Big Island
VA0025020

Hardness Composite -- Outfall 003

Date	mg/L as $CaCO_3$
07/25/05	120
07/27/05	122
07/29/05	126
10/31/05	165
11/02/05	169
11/04/05	176
02/06/06	154
02/08/06	153
02/10/06	148
05/15/06	132
05/17/06	133
05/19/06	133
08/14/06	182
08/16/06	176
08/18/06	186
12/11/06	237
12/13/06	240
12/15/06	242
04/23/07	144
04/24/07	132
04/25/07	144
04/27/07	156
10/23/07	230
10/24/07	240
10/25/07	260
10/26/07	220
04/21/08	144
04/22/08	172
04/24/08	136
10/21/08	176
10/22/08	184
10/23/08	208
10/24/08	200
05/19/09	152
05/20/09	160
05/22/09	140
07/28/09	224
07/29/09	240
07/31/09	214
10/27/09	84
10/28/09	100
10/30/09	100
Mean	170

GP Big Island
VA0003026

Effluent Bacteria

Date	E. coli (#/100 mL) Secondary Clarifier Effluent	Final Effluent (Outfall 003)
3/29/10	256	41
3/30/10	300	31
3/31/10	135	110

52 #/100 mL geometric mean - outfall 003

Analytical Data

Client: Georgia-Pacific Corporation

Job Number: 700-42420-1

Client Sample ID:	VOC Grab 1-4 Composite		
Lab Sample ID:	700-42420-7	Date Sampled:	10/27/2009 0000
Client Matrix:	Water	Date Received:	10/28/2009 0830

624 Volatile Organic Compounds (GC/MS)

Method:	624	Analysis Batch: 700-75289		Instrument ID:	VMI
Preparation:	N/A			Lab File ID:	I102910.D
Dilution:	1.0			Initial Weight/Volume:	5 mL
Date Analyzed:	10/29/2009 1411			Final Weight/Volume:	5 mL
Date Prepared:					

Analyte	Result (ug/L)	Qualifier	MDL	RL
Acrolein	<100	*	2.8	100
Acrylonitrile	<100		5.4	100
Benzene	<5.0		0.49	5.0
Bromoform	<5.0		0.90	5.0
Carbon tetrachloride	<5.0		0.76	5.0
Chlorobenzene	<5.0		0.93	5.0
Chlorodibromomethane	<5.0		0.75	5.0
Chloroethane	<10		0.53	10
2-Chloroethyl vinyl ether	<50		3.3	50
Chloroform	<5.0		0.42	5.0
Dichlorobromomethane	<5.0		0.67	5.0
1,1-Dichloroethane	<5.0		0.50	5.0
1,2-Dichloroethane	<5.0		0.63	5.0
1,1-Dichloroethene	<5.0		0.57	5.0
1,2-Dichloropropane	<5.0		0.49	5.0
cis-1,3-Dichloropropene	<5.0		0.65	5.0
trans-1,3-Dichloropropene	<5.0		0.74	5.0
Ethylbenzene	<5.0		0.67	5.0
Bromomethane	<10		0.50	10
Chloromethane	<10		0.43	10
Methylene Chloride	<5.0		0.38	5.0
1,1,2,2-Tetrachloroethane	<5.0		0.99	5.0
Tetrachloroethene	<5.0		0.57	5.0
Toluene	<5.0		0.51	5.0
trans-1,2-Dichloroethene	<5.0		0.44	5.0
1,1,1-Trichloroethane	<5.0		0.65	5.0
1,1,2-Trichloroethane	<5.0		0.86	5.0
Trichloroethene	<5.0		0.49	5.0
Vinyl chloride	<10		0.54	10
Dichlorodifluoromethane	<5.0	*	0.54	5.0
Trichlorofluoromethane	<5.0		0.48	5.0

Surrogate	%Rec	Qualifier	Acceptance Limits
Toluene-d8 (Surr)	84		77 - 116
Dibromofluoromethane	99		66 - 125
4-Bromofluorobenzene	80		70 - 118

Analytical Data

Client: Georgia-Pacific Corporation

Job Number: 700-42420-1

Client Sample ID: **Outfall 003 Composite**

Lab Sample ID: 700-42420-2
Client Matrix: Water

Date Sampled: 10/27/2009 0850
Date Received: 10/28/2009 0830

625 Semivolatile Organic Compounds (GC/MS)

Method:	625	Analysis Batch: 700-75050	Instrument ID:	SMC
Preparation:	3520C	Prep Batch: 700-75012	Lab File ID:	C110330.D
Dilution:	2.0		Initial Weight/Volume:	1030 mL
Date Analyzed:	11/03/2009 2248		Final Weight/Volume:	1.0 mL
Date Prepared:	10/30/2009 1830		Injection Volume:	1 uL

Analyte	Result (ug/L)	Qualifier	MDL	RL
2,4,6-Trichlorophenol	<3.9		1.5	3.9
2-Chloronaphthalene	<3.9		1.6	3.9
2-Chlorophenol	<3.9		1.6	3.9
2,4-Dichlorophenol	<3.9		1.4	3.9
2,4-Dimethylphenol	<3.9		1.6	3.9
2,4-Dinitrotoluene	<3.9		1.6	3.9
2,6-Dinitrotoluene	<3.9		1.6	3.9
3,3'-Dichlorobenzidine	<7.8		3.9	7.8
4,6-Dinitro-2-methylphenol	<19		1.6	19
2,4-Dinitrophenol	<19		1.3	19
1,2-Diphenylhydrazine	<3.9		3.9	3.9
2-Nitrophenol	<3.9	*	1.2	3.9
4-Chloro-3-methylphenol	<3.9	*	1.9	3.9
4-Chlorophenyl phenyl ether	<3.9		1.6	3.9
4-Bromophenyl phenyl ether	<3.9		1.7	3.9
4-Nitrophenol	<19	*	1.1	19
Acenaphthene	<3.9		1.8	3.9
Acenaphthylene	<3.9	*	2.5	3.9
Anthracene	<3.9		1.7	3.9
Benzidine	<31		6.6	31
Benzo[a]anthracene	<3.9		2.1	3.9
Benzo[a]pyrene	<3.9		2.5	3.9
Benzo[b]fluoranthene	<3.9		2.1	3.9
Benzo[g,h,i]perylene	<3.9		1.9	3.9
Benzo[k]fluoranthene	<3.9		2.3	3.9
Bis(2-chloroethoxy)methane	<3.9		3.7	3.9
Bis(2-chloroethyl)ether	<3.9		1.5	3.9
Bis(2-ethylhexyl) phthalate	<3.9		4.3	3.9
2,2'-oxybis(2-chloropropane)	<3.9		1.0	3.9
Butyl benzyl phthalate	<3.9		2.1	3.9
Chrysene	<3.9		2.1	3.9
Di-n-butyl phthalate	<3.9		3.9	3.9
Di-n-octyl phthalate	<3.9		2.7	3.9
Dibenz(a,h)anthracene	<3.9		1.8	3.9
Diethyl phthalate	<3.9		2.1	3.9
Dimethyl phthalate	<3.9		1.9	3.9
Fluorene	<3.9		1.7	3.9
Fluoranthene	<3.9		1.9	3.9
Hexachlorobenzene	<3.9		1.6	3.9
Hexachlorobutadiene	<3.9		1.8	3.9
Hexachlorocyclopentadiene	<3.9		1.2	3.9
Hexachloroethane	<3.9		1.9	3.9
Isophorone	<3.9		1.9	3.9
Naphthalene	<3.9		1.5	3.9
Nitrobenzene	<3.9		1.3	3.9
Pentachlorophenol	<19	*	1.4	19

Analytical Data

Client: Georgia-Pacific Corporation

Job Number: 700-42420-1

Client Sample ID: **Outfall 003 Composite**

Lab Sample ID:	700-42420-2	Date Sampled:	10/27/2009 0850
Client Matrix:	Water	Date Received:	10/28/2009 0830

625 Semivolatile Organic Compounds (GC/MS)

Method:	625	Analysis Batch: 700-75050	Instrument ID:	SMC
Preparation:	3520C	Prep Batch: 700-75012	Lab File ID:	C110330.D
Dilution:	2.0		Initial Weight/Volume:	1030 mL
Date Analyzed:	11/03/2009 2248		Final Weight/Volume:	1.0 mL
Date Prepared:	10/30/2009 1830		Injection Volume:	1 uL

Analyte	Result (ug/L)	Qualifier	MDL	RL
Phenanthrene	<3.9		1.9	3.9
Phenol	<3.9		1.9	3.9
N-Nitrosodi-n-propylamine	<3.9		1.6	3.9
N-Nitrosodimethylamine	<3.9		1.7	3.9
N-Nitrosodiphenylamine	<3.9		4.7	3.9
Pyrene	<3.9		3.1	3.9
1,2,4-Trichlorobenzene	<3.9		1.6	3.9
Indeno[1,2,3-cd]pyrene	<3.9		2.1	3.9
1,2-Dichlorobenzene	<3.9		1.8	3.9
1,3-Dichlorobenzene	<3.9		1.7	3.9
1,4-Dichlorobenzene	<3.9		1.7	3.9

Surrogate	%Rec	Qualifier	Acceptance Limits
2,4,6-Tribromophenol	44		14 - 130
2-Fluorobiphenyl	72		34 - 130
2-Fluorophenol	57		25 - 130
Nitrobenzene-d5	60		39 - 133
Terphenyl-d14	11	X	16 - 158

Analytical Data

Client: Georgia-Pacific Corporation

Job Number: 700-42420-1

Client Sample ID:	**Outfall 003 Composite**
Lab Sample ID:	700-42420-2
Client Matrix:	Water

Date Sampled: 10/27/2009 0850
Date Received: 10/28/2009 0830

608 Organochlorine Pesticides/PCBs in Water

Method:	608	Analysis Batch: 700-75219		Instrument ID:	SGZ
Preparation:	3520C	Prep Batch: 700-74953		Initial Weight/Volume:	1030 mL
Dilution:	5.0			Final Weight/Volume:	5.0 mL
Date Analyzed:	11/03/2009 0036			Injection Volume:	
Date Prepared:	10/29/2009 1800			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
2,4'-DDD	<0.097		0.0074	0.097
2,4'-DDE	<0.097		0.031	0.097
2,4'-DDT	<0.097		0.0082	0.097
4,4'-DDD	<0.097		0.0074	0.097
4,4'-DDE	<0.097		0.0062	0.097
4,4'-DDT	<0.097		0.0082	0.097
Aldrin	<0.049		0.0044	0.049
alpha-BHC	<0.049		0.0054	0.049
alpha-Chlordane	<0.049		0.0025	0.049
beta-BHC	<0.049		0.0035	0.049
Chlordane (technical)	<0.49		0.031	0.49
delta-BHC	<0.049		0.010	0.049
Dieldrin	<0.097		0.0072	0.097
Endosulfan I	<0.049		0.0043	0.049
Endosulfan II	<0.097		0.0046	0.097
Endosulfan sulfate	<0.097		0.0087	0.097
Endrin	<0.097		0.0065	0.097
Endrin aldehyde	<0.097		0.0067	0.097
Endrin ketone	<0.097		0.0077	0.097
gamma-BHC (Lindane)	<0.049		0.0048	0.049
gamma-Chlordane	<0.049		0.0030	0.049
Heptachlor	0.046	J	0.0036	0.049
Heptachlor epoxide	<0.049		0.0038	0.049
Hexachlorobenzene	<0.049		0.011	0.049
Isodrin	<0.049		0.018	0.049
Methoxychlor	<0.49		0.019	0.49
Mirex	<0.49		0.14	0.49
PCB-1016	<0.97		0.11	0.97
PCB-1221	<1.9		0.17	1.9
PCB-1232	<0.97		0.13	0.97
PCB-1242	<0.97		0.17	0.97
PCB-1248	<0.97		0.14	0.97
PCB-1254	<0.97		0.12	0.97
PCB-1260	<0.97		0.12	0.97
Toxaphene	<4.9		0.30	4.9

Surrogate	%Rec	Qualifier	Acceptance Limits
DCB Decachlorobiphenyl	13	X	30 - 150
Tetrachloro-m-xylene	32		30 - 150

Client: Georgia-Pacific Corporation

Job Number: 700-42420-1

Client Sample ID: **Outfall 003 Composite**

Lab Sample ID: 700-42420-2
Client Matrix: Water

Date Sampled: 10/27/2009 0850
Date Received: 10/28/2009 0830

200.8 Metals (ICP/MS)

Method:	200.8	Analysis Batch: 700-75400	Instrument ID:	ICPMS
Preparation:	200.8	Prep Batch: 700-75241	Lab File ID:	N/A
Dilution:	5.0		Initial Weight/Volume:	50 mL
Date Analyzed:	11/09/2009 1213		Final Weight/Volume:	50 mL
Date Prepared:	11/05/2009 0915			

Analyte	Result (ug/L)	Qualifier	MDL	RL
Cadmium	0.59	J	0.060	2.5
Antimony	0.61	J	0.050	1.2
Beryllium	<2.5		0.070	2.5
Thallium	<0.50		0.40	0.50
Molybdenum	1.9	J	0.10	2.5
Iron	82	J	22	120
Nickel	1.2	J	0.50	2.5
Silver	<0.50		0.050	0.50
Arsenic	1.0	J	0.50	1.2
Copper	<2.5		0.30	2.5
Aluminum	370		12	25
Lead	0.73	J	0.10	1.2
Tin	<2.5		0.60	2.5
Selenium	<1.2		0.30	1.2
Chromium	<2.5		2.5	2.5
Cobalt	0.76	J	0.055	2.5
Titanium	5.1		0.75	2.5

Method:	200.8	Analysis Batch: 700-75439	Instrument ID:	ICPMS
Preparation:	200.8	Prep Batch: 700-75241	Lab File ID:	N/A
Dilution:	5.0		Initial Weight/Volume:	50 mL
Date Analyzed:	11/10/2009 2138		Final Weight/Volume:	50 mL
Date Prepared:	11/05/2009 0915			

Analyte	Result (ug/L)	Qualifier	MDL	RL
Barium	270		0.70	2.5
Magnesium	10000	B	5.0	120

Method:	200.8	Analysis Batch: 700-75459	Instrument ID:	ICPMS
Preparation:	200.8	Prep Batch: 700-75241	Lab File ID:	N/A
Dilution:	5.0		Initial Weight/Volume:	50 mL
Date Analyzed:	11/12/2009 1050		Final Weight/Volume:	50 mL
Date Prepared:	11/05/2009 0915			

Analyte	Result (ug/L)	Qualifier	MDL	RL
Boron	1100		4.2	5.0
Zinc	9.4	J	4.5	20

Method:	200.8	Analysis Batch: 700-75610	Instrument ID:	ICPMS
Preparation:	200.8	Prep Batch: 700-75241	Lab File ID:	N/A
Dilution:	5.0		Initial Weight/Volume:	50 mL
Date Analyzed:	11/13/2009 1818		Final Weight/Volume:	50 mL
Date Prepared:	11/05/2009 0915			

Analyte	Result (ug/L)	Qualifier	MDL	RL
Manganese	530		1.3	12

Analytical Data

Client: Georgia-Pacific Corporation

Job Number: 700-42420-1

Client Sample ID: **Outfall 003 Composite**

Lab Sample ID: 700-42420-2

Client Matrix: Water

Date Sampled: 10/27/2009 0850

Date Received: 10/28/2009 0830

245.1 Mercury (CVAA)

Method:	245.1	Analysis Batch: 700-75114		Instrument ID:	LEEMAN HYDRA
Preparation:	245.1	Prep Batch: 700-75007		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	40 mL
Date Analyzed:	10/30/2009 1933			Final Weight/Volume:	40 mL
Date Prepared:	10/30/2009 1400				

Analyte	Result (mg/L)	Qualifier	MDL	RL
Mercury	0.00010	J B	0.000071	0.00020

General Chemistry

Client Sample ID: **Outfall 003 Grab**

Lab Sample ID: 700-42420-1

Client Matrix: Water

Date Sampled: 10/27/2009 0850

Date Received: 10/28/2009 0830

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
HEM (Oil & Grease)	<5.3		mg/L	3.5	5.3	1.0	1664A
Analysis Batch: 700-75213	Date Analyzed: 11/03/2009 1000						
Prep Batch: 700-75211	Date Prepared: 11/03/2009 1000						
Silica Gel Treated n-Hexane Extractable Material	<5.3		mg/L	3.5	5.3	1.0	1664A
Analysis Batch: 700-75319	Date Analyzed: 11/05/2009 1600						
Prep Batch: 700-75318	Date Prepared: 11/05/2009 1600						
Cyanide, Total	0.0060	J	mg/L	0.0060	0.010	1.0	335.4
Analysis Batch: 700-75148	Date Analyzed: 11/03/2009 1335						
Prep Batch: 700-75147	Date Prepared: 11/03/2009 0920						
Phenolics, Total Recoverable	0.0090	J	mg/L	0.0030	0.010	1.0	420.1
Analysis Batch: 700-75160	Date Analyzed: 11/03/2009 1200						
Prep Batch: 700-75142	Date Prepared: 11/02/2009 1310						
Phenols, Total	0.0090	J	mg/L	0.0030	0.010	1.0	420.1
Analysis Batch: 700-75160	Date Analyzed: 11/03/2009 1200						
Prep Batch: 700-75142	Date Prepared: 11/02/2009 1310						

General Chemistry

Client Sample ID: **Outfall 003 Composite**

Lab Sample ID: 700-42420-2 Date Sampled: 10/27/2009 0850
Client Matrix: Water Date Received: 10/28/2009 0830

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Fluoride	0.12	J	mg/L	0.12	0.20	10	300.0
Analysis Batch: 700-75072	Date Analyzed: 10/30/2009 2251						
Chloride	76		mg/L	0.16	0.20	10	300.0
Analysis Batch: 700-75072	Date Analyzed: 10/30/2009 2251						
Sulfate	86		mg/L	0.10	0.20	10	300.0
Analysis Batch: 700-75072	Date Analyzed: 10/30/2009 2251						
Bromide	6.5		mg/L	0.10	0.20	10	300.0
Analysis Batch: 700-75072	Date Analyzed: 10/30/2009 2251						
Ammonia	0.24		mg/L	0.014	0.050	1.0	350.1
Analysis Batch: 400-98820	Date Analyzed: 11/06/2009 1300						
Nitrogen, Kjeldahl	1.8		mg/L	0.16	0.50	1.0	351.2
Analysis Batch: 400-98938	Date Analyzed: 11/10/2009 1508						
Prep Batch: 400-98579	Date Prepared: 11/04/2009 1250						
Phosphorus, Total	0.24	B	mg/L	0.057	0.10	1.0	365.4
Analysis Batch: 400-98683	Date Analyzed: 11/05/2009 1527						
Prep Batch: 400-98580	Date Prepared: 11/04/2009 1250						
Total Organic Carbon	43	B	mg/L	0.17	1.0	1.0	415.1
Analysis Batch: 700-74983	Date Analyzed: 10/30/2009 1436						
Methylene Blue Active Substances	0.082	J	mg/l LAS	0.068	0.10	1.0	425.1
Analysis Batch: 700-74914	Date Analyzed: 10/28/2009 1630						
Chemical Oxygen Demand	140		mg/L	12	20	1.0	SM 5220C
Analysis Batch: 700-75608	Date Analyzed: 11/16/2009 0858						
Prep Batch: 700-75607	Date Prepared: 11/13/2009 1615						

DATA REPORTING QUALIFIERS

Client: Georgia-Pacific Corporation

Job Number: 700-42420-1

Lab Section	Qualifier	Description
GC/MS VOA		
	*	LCS or LCSD exceeds the control limits
GC/MS Semi VOA		
	*	LCS or LCSD exceeds the control limits
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
	*	RPD of the LCS and LCSD exceeds the control limits
	X	Surrogate exceeds the control limits
GC Semi VOA		
	*	LCS or LCSD exceeds the control limits
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
	*	RPD of the LCS and LCSD exceeds the control limits
	X	Surrogate exceeds the control limits
Metals		
	B	Compound was found in the blank and sample.
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
General Chemistry		
	B	Compound was found in the blank and sample.
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

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Client Sheet No. 9310158
Page Five
Client Georgia Pacific Corporation
Date November 17, 1993

Sample No.: 68737

Time Collected: N.A.

Date Collected: 10/13 - 10/14/93

Description: Outfall 003 Wastewater Composite

Analysis	Result	MDL		PQL	
PCBs:					
PCB-1016	ND	0.001	mg/L	0.001	mg/L
PCB-1221	ND	0.001	mg/L	0.001	mg/L
PCB-1232	ND	0.001	mg/L	0.001	mg/L
PCB-1242	ND	0.001	mg/L	0.001	mg/L
PCB-1248	ND	0.001	mg/L	0.001	mg/L
PCB-1254	ND	0.001	mg/L	0.001	mg/L
PCB-1260	ND	0.001	mg/L	0.001	mg/L
Volatile Compounds:					
Acrolein	ND	0.010	mg/L	0.050	mg/L
Acrylonitrile	ND	0.010	mg/L	0.050	mg/L
Benzene	ND	0.005	mg/L	0.010	mg/L
Bromodichloromethane	ND	0.005	mg/L	0.010	mg/L
Bromoform	ND	0.005	mg/L	0.010	mg/L
Bromomethane	ND	0.010	mg/L	0.010	mg/L
Carbon Tetrachloride	ND	0.010	mg/L	0.010	mg/L
Chlorobenzene	ND	0.005	mg/L	0.050	mg/L
Chloroethane	ND	0.010	mg/L	0.050	mg/L
2-Chloroethyl Vinyl Ether	ND	0.005	mg/L	0.010	mg/L
Chloroform	ND	0.005	mg/L	0.010	mg/L
Chloromethane	ND	0.010	mg/L	0.020	mg/L
Dibromochloromethane	ND	0.005	mg/L	0.010	mg/L
1,1-Dichloroethane	ND	0.010	mg/L	0.010	mg/L
1,2-Dichloroethane	ND	0.005	mg/L	0.010	mg/L
1,1-Dichloroethene	ND	0.010	mg/L	0.010	mg/L
trans-1,2-Dichloroethene	ND	0.010	mg/L	0.010	mg/L
1,2-Dichloropropane	ND	0.005	mg/L	0.010	mg/L
cis-1,3-Dichloropropene	ND	0.005	mg/L	0.010	mg/L
trans-1,3-Dichloropropene	ND	0.005	mg/L	0.010	mg/L
Ethyl Benzene	ND	0.005	mg/L	0.010	mg/L
Methylene Chloride	ND	0.10	mg/L*	0.10	mg/L*
sym-Tetrachloroethane	ND	0.005	mg/L	0.010	mg/L
Tetrachloroethene	ND	0.005	mg/L	0.010	mg/L
Toluene	ND	0.005	mg/L	0.010	mg/L
1,1,1-Trichloroethane	ND	0.010	mg/L	0.010	mg/L
1,1,2-Trichloroethane	ND	0.005	mg/L	0.010	mg/L
Trichloroethene	ND	0.010	mg/L	0.010	mg/L
Trichlorofluoromethane	ND	0.010	mg/L	0.010	mg/L
Vinyl Chloride	ND	0.010	mg/L	0.010	mg/L

* Compound detected in method blank; MDL and PQL have been raised accordingly.

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Client Sheet No.	9310191
Page	Five
Client	Georgia Pacific
Date	November 24, 1993

Sample No.: 68803

Time Collected: 9:15 a.m. - 9:15 a.m.

Date Collected: 10/18 - 10/19/93

Description: Outfall 003
Composite

Analysis	Result	MDL	PQL
PCBs:			
PCB-1016	ND	0.0008 mg/L	0.008 mg/L
PCB-1221	ND	0.0008 mg/L	0.008 mg/L
PCB-1232	ND	0.0008 mg/L	0.008 mg/L
PCB-1242	ND	0.0008 mg/L	0.008 mg/L
PCB-1248	ND	0.0008 mg/L	0.008 mg/L
PCB-1254	ND	0.0008 mg/L	0.008 mg/L
PCB-1260	ND	0.0008 mg/L	0.008 mg/L

REI Consultants Inc.

Date: *28-Dec-04*

Client:	GEORGIA PACIFIC CORPORATION	**Lab Order:**	0410A73
Client Sample ID:	003 COMP	**Lab ID:**	0410A73-02A
Project:	VPDES PERMIT RENEWAL	**Collection Date:**	10/26/2004
Site ID:		**Matrix:**	LIQUID

Analyses	Result	Units	MDL	PQL	Qual	Date Analyzed	Analyst
PESTICIDES/PCBS			**E608**				
4,4´-DDD	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
4,4´-DDE	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
4,4´-DDT	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Aldrin	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
alpha-BHC	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Aroclor 1016	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Aroclor 1221	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Aroclor 1232	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Aroclor 1242	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Aroclor 1248	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Aroclor 1254	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Aroclor 1260	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
beta-BHC	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Chlordane	ND	mg/L	NA	0.00500		11/01/04 9:44 PM	SA/JR
delta-BHC	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Dieldrin	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Endosulfan I	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Endosulfan II	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Endosulfan sulfate	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Endrin	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Endrin aldehyde	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
gamma-BHC	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Heptachlor	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Heptachlor epoxide	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Methoxychlor	ND	mg/L	NA	0.000500		11/01/04 9:44 PM	SA/JR
Toxaphene	ND	mg/L	NA	0.00500		11/01/04 9:44 PM	SA/JR
Surr: tetrachloro-m-xylene	35	%REC	NA	30-130		11/01/04 9:44 PM	SA/JR

Qualifiers:

ND - Not Detected at the PQL or MDL	J - Analyte detected below PQL
PQL - Practical Quantitation Limit	S - Spike Recovery outside accepted recovery limits
MDL - Minimum Detection Limit	E - Value above quantitation range
NA - Not Applicable	B - Analyte detected in the associated Method Blank
TIC - Tentatively Identified Compounds	H - Sample extraction/analysis holding time exceeded

Attachment H

Reduced Monitoring Frequency Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Justification for Reduced Monitoring Frequency
Reissuance of VPDES Permit No. VA0003026; GP Big Island, LLC

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior BLF

DATE: February 5, 2010

Compliance History

The VPDES Permit Manual recommends effluent monitoring frequencies. Guidance Memorandum 98-2005 allows for reduced monitoring at facilities with excellent compliance histories. For this reissuance, the eligibility for reduced monitoring has been evaluated.

To qualify for consideration of reduced monitoring, the facility should not have been issued any Letter of Noncompliance (LON), Notice of Violation (NOV), Warning Letter, or Notice of Unsatisfactory Laboratory Evaluations, or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years.

This facility received the following Warning Letters within the past three years:

Warning Letter No. W2006-05-1003:	The March 2006 Discharge Monitoring Report (DMR) shows total contact chlorine minimum concentration reported as parameter 005 for outfall 301 instead of parameter rather than parameter #157. This administrative CEDS code reporting error does not affect the quality of the data.
Warning Letter No. W2006-10-W-1007:	(April - August 2006): The permittee created DMR for GP Big Island did not show the limit for BOD_5 (parameter 003) at outfall 003. The loading data for this parameter was reported and so this minor omission does not affect the quality of the data.

These two warning letters refer to template information of the DMR form and do not in any way reflect upon the quality of the operation of the treatment facility or the quality of the data analysis procedures. Based upon a review of the files, it is believed that this facility has an exemplary operation and shall therefore qualify for a reduced monitoring evaluation of the data submitted on the DMRs.

Monitoring Data Evaluation

Discharge Monitoring Report (DMR) data from December 2006 through November 2009 were reviewed and tabulated in the attached tables. Temperature, pH, color rise, total suspended solids (TSS), and biochemical oxygen demand (BOD_5) have been considered for reduced monitoring. The actual performance to permit limit ratios are summarized in the tables that follows. Facilities with baseline monitoring that have an actual performance to permit limit ratio of greater than 75 percent are not eligible for reduced monitoring.

Table 1 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 999 (Calculated Limits)**

Parameter	Actual Performance/ Permit Limit Maximum	Average Performance/Permit Limit (Maximum)	2005 - 2010 Permit Frequency	Reduced Monitoring
Color Rise	19%	--	1/Month	1/Month
Heat Rejected Limit (BTU/hr)	26%	--	1/Month	1/Month
BOD_5	24%	17%	1/Month	1/ Month

Outfall 999 = calculated values from outfalls 001, 002, and 003 with the exception of the heat rejected limit which is calculated from outfalls 001 and 002.

Since these limits are calculated from monitoring data collected from outfalls 001, 002, and 003, the monitoring frequencies for the individual outfalls are evaluated. The reduced monitoring evaluations of outfalls 001, 002, and 003 are based upon the evaluation of the performance values given in the above table.

Table 2 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 001 and Outfall 002**

Parameter	Actual Performance/ Permit Limit Monthly Average	Actual Performance/ Permit Limit (Maximum)	2005 - 2010 Permit Frequency	Reduced Monitoring
Color	(see calculated color limit associated with outfall 999)		5 Days/Week	1/Week
Temperature	(see calculated heat rejected limit associated with outfall 999)		5 Days/Week	2 Days /Week

Table 2 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 001 and Outfall 002 (Continued)**

Parameter	Actual Performance/ Permit Limit Monthly Average	Actual Performance/ Permit Limit (Maximum)	2005 - 2010 Permit Frequency	Reduced Monitoring
BOD_5	(see calculated BOD_5 limit associated with outfall 999)		1/Week	1/Week
BOD_5 (intake)	(see calculated BOD_5 limit associated with outfall 999)		1/Week	1/ Week

pH: For outfall 001, two of the monthly pH values were within 0.5 S.U. of the limit. For outfall 002, five of the monthly pH values were within 0.5 S.U. of the limit. Therefore, this facility's outfall 001 and 002 do not qualify for a reduction in pH monitoring frequency.

Color: A limit for color is a calculated value from monitoring of outfalls 001, 002, and 003. The limit from these three outfalls is given in outfall 999. The DMR data for outfall 999 are consistently well below the permit limit. The actual performance to permit limit ratio is summarized in Table 1. According to Guidance Memorandum 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. So, the outfall 001 and 002 color monitoring frequency has been reduced from 5 days/week to 1/week.

Temperature: Temperature is measured for outfalls 001 and 002 to calculate the heat rejected limit for outfall 999. The heat rejected limit data for outfall 999 are consistently well below the permit limits. The actual performance to permit limit ratio is summarized in Table 1. According to Guidance Memorandum 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of between 49 and 25 percent are eligible for a reduced monitoring frequency of 2 days/week. The outfall 001 and 002 temperature monitoring frequency has been reduced from 5 days/week to 2 days/week.

BOD_5, BOD_5 (intake): A limit for BOD_5 is given as a calculated value from monitoring of outfalls 001, 002, and 003. The BOD_5 limit for these three outfalls is given in outfall 999. The BOD_5 limit monitoring data for outfall 999 are consistently well below the permit limits. The actual performance to permit limit ratios for outfall 999 are summarized in Table 1. According to Guidance Memorandum 98-2005, facilities with 1/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/ 2 months. However, outfall 003 is not eligible for a reduced monitoring frequency less than 1/week as discussed below. Since the limit given in outfall 999 is based upon monitoring results from outfalls 001, 002, and 003, the BOD_5 monitoring frequency for outfalls 001 and 002 will continue to be monitored 1/week.

Table 3 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 003**

Parameter	Actual Performance/ Permit Limit Monthly Average*	Actual Performance/ Permit Limit (Maximum)*	2005 - 2010 Permit Frequency	Reduced Monitoring
BOD_5	--/17.2%	--/24.9%	5 Days/Week	1/Week
Total Suspended Solids	--/6.54%	--/7.45%	5 Days/Week	1/Week
Color	(see calculated color rise limit associated with outfall 999)		5 Days/Week	1/Week

*The ratio based upon concentration is listed first, and the ratio based upon loading is listed second.

pH: Four of the monthly pH values were within 0.5 S.U. of the limit. Therefore, this facility's outfall 003 does not qualify for a reduction in pH monitoring frequency.

BOD_5: The BOD_5 limit monitoring data for outfall 003 are consistently well below the permit limits. The actual performance to permit limit ratios for outfall 003 are summarized in Table 3. According to Guidance Memorandum 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. So, the outfall 003 BOD_5 monitoring frequency has been reduced from 5 days/week to 1/week.

TSS: The DMR data for outfall 003 are consistently well below the permit limits. The actual performance to permit limit ratios are summarized in Table 3. According to Guidance Memorandum 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. The outfall 003 monitoring frequency for TSS has been reduced from 5 days/week to 1/week.

Color: A limit for color rise is a calculated value from monitoring of outfalls 001, 002, and 003. The limit from these three outfalls is given in outfall 999. The DMR data for outfall 999 are consistently well below the permit limit. The actual performance to permit limit ratio is summarized in Table 1. According to Guidance Memorandum 98-2005, facilities with 5 days/week baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/week. So, the outfall 003 monitoring frequency for color has been reduced from 5 days/week to 1/week.

Table 4 **Performance to Permit Limit Ratios (DMR Data) -- Outfall 301**

Parameter	Actual Performance/ Permit Limit Monthly Average*	Actual Performance/ Permit Limit (Maximum)*	2005 - 2010 Permit Frequency	Reduced Monitoring
BOD_5	20% / 2.2%	13%/ 2.0%	1/Month	1/ 6 Months
TSS	16% / 1.7%	10%/ 1.1%	1/Month	1/ 6 Months

*The ratio based upon concentration is listed first, and the ratio based upon loading is listed second.

pH : Eleven of the monthly pH values were within 0.5 S.U. of the limit. Therefore, this facility's outfall 301 does not qualify for a reduction in pH monitoring frequency.

BOD_5: All of the DMR data for outfall 301 are well below the permit limits. According to Guidance Memorandum 98-2005, facilities with 1/month baseline monitoring that have an actual performance to permit limit ratio less than 25 percent are eligible for a reduced monitoring frequency of 1/ 6 months. Therefore, the outfall 301 monitoring frequency for BOD_5 has been reduced from 1/months.

TSS: All the DMR data for outfall 301 are well below the permit limits. According to Guidance Memorandum 98-2005, facilities with 1/month baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/ 6 months. Therefore, the outfall 301 monitoring frequency for TSS has been reduced from 1/month to 1/ 6 months.

The permit will contain a special condition that will revert the reduced monitoring frequencies for outfalls 001, 002, and 003 back to previous 2005 – 2010 frequencies if a Notice of Violation is issued for any of the parameters with reduced monitoring. The permittee is still expected to take all appropriate measures to control both the average and maximum concentrations of the pollutants of concern, regardless of any reductions in monitoring frequencies.

Table 5 **DMR Data for GP Big Island (Outfall 001)**

Month Due	Flow (MGD)	pH min S.U.	pH H ion conc	pH max S.U.	pH H ion conc
10-Jan-07	0.061	7.1	7.943E-08	8.1	7.943E-09
10-Feb-07	0.065	7	1.000E-07	7.7	1.995E-08
10-Mar-07	0.05	7.2	6.310E-08	7.7	1.995E-08
10-Apr-07	0.06	6.7	1.995E-07	7.7	1.995E-08
10-May-07	0.07	6.9	1.259E-07	7.9	1.259E-08
10-Jun-07	0.082	7.5	3.162E-08	8.2	6.310E-09
10-Jul-07	0.091	6.8	1.585E-07	7.9	1.259E-08
10-Aug-07	0.123	7.5	3.162E-08	8.1	7.943E-09
10-Sep-07	0.09	7.6	2.512E-08	8.2	6.310E-09
10-Oct-07	0.093	7.7	1.995E-08	8.3	5.012E-09
10-Nov-07	0.074	7.6	2.512E-08	8.3	5.012E-09
10-Dec-07	0.024	7.6	2.512E-08	7.9	1.259E-08
10-Jan-08	0.009	7.1	7.943E-08	8.3	5.012E-09
10-Feb-08	0.375	6.8	1.585E-07	8.2	6.310E-09
10-Mar-08	0.02	7.3	5.012E-08	8.2	6.310E-09
10-Apr-08	0.038	7	1.000E-07	8.1	7.943E-09
10-May-08	0.06	7.1	7.943E-08	7.6	2.512E-08
10-Jun-08	0.066	7.1	7.943E-08	7.9	1.259E-08
10-Jul-08	0.081	7.6	2.512E-08	7.9	1.259E-08
10-Aug-08	0.078	7.7	1.995E-08	8.3	5.012E-09
10-Sep-08	0.09	7.7	1.995E-08	8.4	3.981E-09
10-Oct-08	0.105	7.7	1.995E-08	8.5	3.162E-09
10-Nov-08	0.121	8.1	7.943E-09	8.7	1.995E-09
10-Dec-08	0.075	7.9	1.259E-08	8.3	5.012E-09
10-Jan-09	0.075	7.3	5.012E-08	8.1	7.943E-09
10-Feb-09	0.08	7.2	6.310E-08	7.9	1.259E-08
10-Mar-09	0.051	7.1	7.943E-08	8	1.000E-08
10-Apr-09	0.052	7	1.000E-07	8	1.000E-08
10-May-09	0.051	6.9	1.259E-07	7.5	3.162E-08
10-Jun-09	0.05	7	1.000E-07	8.2	6.310E-09
10-Jul-09	0.04	7	1.000E-07	8.3	5.012E-09
10-Aug-09	0.05	7.3	5.012E-08	8.1	7.943E-09
10-Sep-09	0.055	7.6	2.512E-08	8.1	7.943E-09
10-Oct-09	0.059	8	1.000E-08	8.3	5.012E-09
10-Nov-09	0.032	7.6	2.512E-08	8.2	6.310E-09
10-Dec-09	0.025	7.1	7.943E-08	7.7	1.995E-08
mean	0	7.2	6.516E-08	8.0	1.005E-08
maximum	0.375			8.7	
minimum	0.009	6.7			
permit limit		6.0		9.0	

Table 6 **DMR Data for GP Big Island (Outfall 002)**

Month Due	Flow (MGD)	pH			
		min S.U.	H ion conc	max S.U.	H ion conc
10-Jan-07	2.96	7.3	5.012E-08	7.8	1.585E-08
10-Feb-07	2.96	7.1	7.943E-08	7.8	1.585E-08
10-Mar-07	3.02	7.4	3.981E-08	8.2	6.310E-09
10-Apr-07	3.08	6.8	1.585E-07	8.2	6.310E-09
10-May-07	3.05	7	1.000E-07	8	1.000E-08
10-Jun-07	2.64	7.7	1.995E-08	8.4	3.981E-09
10-Jul-07	3.3	7.5	3.162E-08	8.1	7.943E-09
10-Aug-07	2.95	7.8	1.585E-08	8.4	3.981E-09
10-Sep-07	2.32	8	1.000E-08	8.3	5.012E-09
10-Oct-07	2.39	8.1	7.943E-09	8.4	3.981E-09
10-Nov-07	2.52	7.7	1.995E-08	8.5	3.162E-09
10-Dec-07	2.31	7.7	1.995E-08	8.2	6.310E-09
10-Jan-08	2.34	7.3	5.012E-08	8.4	3.981E-09
10-Feb-08	2.03	7.4	3.981E-08	8.3	5.012E-09
10-Mar-08	2.32	7.4	3.981E-08	8.1	7.943E-09
10-Apr-08	2.57	7.3	5.012E-08	8.2	6.310E-09
10-May-08	2.59	7.1	7.943E-08	7.9	1.259E-08
10-Jun-08	2.51	7.4	3.981E-08	8.3	5.012E-09
10-Jul-08	2.54	7.7	1.995E-08	8.1	7.943E-09
10-Aug-08	2.57	7.8	1.585E-08	8.3	5.012E-09
10-Sep-08	2.17	7.9	1.259E-08	8.4	3.981E-09
10-Oct-08	2.05	7.5	3.162E-08	8.2	6.310E-09
10-Nov-08	2.89	8	1.000E-08	8.7	1.995E-09
10-Dec-08	1.62	8	1.000E-08	8.4	3.981E-09
10-Jan-09	3.65	7.3	5.012E-08	8.1	7.943E-09
10-Feb-09	2.96	7.3	5.012E-08	8.1	7.943E-09
10-Mar-09	2.24	7.5	3.162E-08	8.5	3.162E-09
10-Apr-09	2	7	1.000E-07	8.2	6.310E-09
10-May-09	1.85	7	1.000E-07	7.6	2.512E-08
10-Jun-09	2.75	6.9	1.259E-07	8.1	7.943E-09
10-Jul-09	3.53	6.9	1.259E-07	8.2	6.310E-09
10-Aug-09	2.38	7.6	2.512E-08	8.6	2.512E-09
10-Sep-09	1.34	7.7	1.995E-08	8.1	7.943E-09
10-Oct-09	2.58	7.9	1.259E-08	8.4	3.981E-09
10-Nov-09	3.3	7.6	2.512E-08	8.7	1.995E-09
10-Dec-09	1.81	6.8	1.585E-07	7.7	1.995E-08
mean	3	7.3	4.937E-08	8.1	7.219E-09
maximum	3.65			8.7	
minimum	1.34	6.8			
permit limit		6.0		9.0	

Table 7 **DMR Data for GP Big Island (Outfall 003)**

Month Due	Flow	pH				TSS				BOD_5		Temp °C
		min S.U.	H ion conc	max S.U.	H ion conc	average kg/d	max kg/d	average mg/L	max mg/L	average kg/d	max kg/d	
10-Jan-07	6.68	7.7	1.995E-08	8.3	5.012E-09	395	1020	15	37	242	465	19
10-Feb-07	7.03	7.7	1.995E-08	8.1	7.943E-09	429	889	16	30	301	593	18
10-Mar-07	6.64	6.8	1.585E-07	8.3	5.012E-09	315	581	12	19	303	787	15.5
10-Apr-07	6.89	7.6	2.512E-08	8.1	7.943E-09	296	574	11	19	366	860	22
10-May-07	6.95	7.7	1.995E-08	8	1.000E-08	273	543	10	17	295	762	23
10-Jun-07	6.72	7.6	2.512E-08	8	1.000E-08	172	382	7	15	215	633	27
10-Jul-07	7.92	7.4	3.981E-08	7.9	1.259E-08	185	648	6	20	195	830	28
10-Aug-07	7.7	7.4	3.981E-08	7.9	1.259E-08	228	620	8	23	280	937	29
10-Sep-07	8.04	7.6	2.512E-08	8	1.000E-08	163	318	5	10	250	836	30.6
10-Oct-07	7.77	7.6	2.512E-08	7.9	1.259E-08	216	298	7	10	253	600	29
10-Nov-07	7.65	7.7	1.995E-08	8	1.000E-08	212	379	7	13	349	648	27
10-Dec-07	7.16	7.8	1.585E-08	8.8	1.585E-09	517	885	19	33	510	1152	19
10-Jan-08	7.34	7.7	1.995E-08	8	1.000E-08	399	847	14	33	486	1078	18
10-Feb-08	7.27	7.8	1.585E-08	8.1	7.943E-09	493	1401	18	49	523	1900	17
10-Mar-08	7.18	7.7	1.995E-08	8.2	6.310E-09	619	1494	23	55	448	1358	17
10-Apr-08	7.28	7.8	1.585E-08	8.7	1.995E-09	272	565	10	21	366	1129	18
10-May-08	7.63	7.7	1.995E-08	8	1.000E-08	261	714	9	23	315	898	23
10-Jun-08	7.26	7.6	2.512E-08	8.1	7.943E-09	220	490	8	16	330	980	26
10-Jul-08	7.6	7.8	1.585E-08	8.1	7.943E-09	173	470	6	15	299	987	30
10-Aug-08	7.7	7.8	1.585E-08	8.4	3.981E-09	199	402	7	14	338	809	39
10-Sep-08	7.83	7.7	1.995E-08	8.2	6.310E-09	587	917	20	26	404	955	28
10-Oct-08	8.53	7.8	1.585E-08	8.2	6.310E-09	417	896	13	28	257	587	27
10-Nov-08	7.79	7.7	1.995E-08	8.5	3.162E-09	359	749	12	29	248	641	25
10-Dec-08	7.46	7.1	7.943E-08	8.3	5.012E-09	830	1535	30	52	525	1026	20
10-Jan-09	7.59	7.2	6.310E-08	8.1	7.943E-09	653	1366	23	47	360	1293	19
10-Feb-09	7.35	7.5	3.162E-08	8.2	6.310E-09	705	1369	26	46	495	1273	14
10-Mar-09	7.17	7.1	7.943E-08	8.2	6.310E-09	1241	3233	46	129	462	852	16
10-Apr-09	7	7.1	7.943E-08	8.1	7.943E-09	219	425	8	14	177	434	18
10-May-09	7.49	7.4	3.981E-08	8	1.000E-08	423	712	15	25	267	890	23
10-Jun-09	8.27	7.5	3.162E-08	8.1	7.943E-09	398	991	12	32	357	2376	26
10-Jul-09	8.49	7.6	2.512E-08	8	1.000E-08	314	707	10	20	317	903	28
10-Aug-09	8.76	7.4	3.981E-08	7.9	1.259E-08	376	1136	11	35	741	2299	29
10-Sep-09	8.36	7.4	3.981E-08	7.8	1.585E-08	203	765	6	23	409	1131	31
10-Oct-09	8.33	7.6	2.512E-08	7.9	1.259E-08	276	689	9	23	242	719	30
10-Nov-09	8.79	7.5	3.162E-08	8.3	5.012E-09	277	574	8	20	367	1233	24
10-Dec-09	8.6	7.4	3.981E-08	8	1.000E-08	428	1399	14	47	723	2822	22
mean	7.62	7.5	3.456E-08		8.185E-09	381.8	860.6	13	30	362	1047	24
maximum	8.79			8.5		1241	3233	46	129	741	2822	39
minimum	6.64	6.8				163.0	298	5	10	177	434	14
permit limit		6.0		9.0		5838	11547			2105	4210	
(mean performance / permit limit) * 100						6.54	7.45			17.2	24.9	

Table 8 **DMR Data for GP Big Island (Outfall 301)**

Month Due	Flow	pH				TSS				BOD_5			
		min S.U.	H ion conc	max S.U.	H ion conc	average kg/d	max kg/d	average mg/L	max mg/L	average kg/d	max kg/d	average mg/L	max mg/L
10-Jan-07	0.014	7.4	3.981E-08	8.3	5.012E-09	0.1	0.1	3	3	<QL	<QL	<QL	<QL
10-Feb-07	0.013	7.3	5.012E-08	8	1.000E-08	0.4	0.4	8	8	0.4	0.4	7	7
10-Mar-07	0.01	7	1.000E-07	8.1	7.943E-09	0.1	0.1	3	3	<QL	<QL	<QL	<QL
10-Apr-07	0.009	7.3	5.012E-08	8.9	1.259E-09	0.1	0.1	3	3	<QL	<QL	<QL	<QL
10-May-07	0.008	7.2	6.310E-08	8	1.000E-08	0	0	1	1	0.2	0.2	9	9
10-Jun-07	0.005	7.2	6.310E-08	8	1.000E-08	0	0	1	1	0.1	0.1	6	6
10-Jul-07	0.007	7.2	6.310E-08	7.8	1.585E-08	0	0	1	1	0.2	0.2	6	6
10-Aug-07	0.009	7.3	5.012E-08	7.8	1.585E-08	0	0	1	1	<QL	<QL	<QL	<QL
10-Sep-07	0.009	7.3	5.012E-08	7.7	1.995E-08	0	0	1	1	0.1	0.1	5	5
10-Oct-07	0.008	7.3	5.012E-08	7.6	2.512E-08	0.1	0.1	4	4	<QL	<QL	<QL	<QL
10-Nov-07	0.008	7.4	3.981E-08	7.9	1.259E-08	0.1	0.1	3	3	<QL	<QL	<QL	<QL
10-Dec-07	0.006	7.5	3.162E-08	8.2	6.310E-09	0.1	0.1	7	7	0.2	0.2	13	13
10-Jan-08	0.007	7.7	1.995E-08	9	1.000E-09	0	0	6	6	<QL	<QL	<QL	<QL
10-Feb-08	0.005	7.3	5.012E-08	8.2	6.310E-09	0.2	0.2	8	8	0.3	0.3	11	11
10-Mar-08	0.007	7.5	3.162E-08	8.6	2.512E-09	0.1	0.1	4	4	0.2	0.2	7	7
10-Apr-08	0.006	7.6	2.512E-08	7.9	1.259E-08	0	0	2	2	0.1	0.1	5	5
10-May-08	0.006	7.6	2.512E-08	8.1	7.943E-09	0	0	1	1	0.1	0.1	9	9
10-Jun-08	0.005	7.6	2.512E-08	8.3	5.012E-09	0	0	2	2	0.1	0.1	8	8
10-Jul-08	0.004	7.8	1.585E-08	8.4	3.981E-09	0.1	0.1	4	4	0.2	0.2	11	11
10-Aug-08	0.003	7.7	1.995E-08	8.5	3.162E-09	0.1	0.1	3	3	0.1	0.2	5	5
10-Sep-08	0.003	7.8	1.585E-08	8.9	1.259E-09	0	0	1	1	0.1	0.1	5	5
10-Oct-08	0.004	6.5	3.162E-07	8.1	7.943E-09	0	0	2	2	0.1	0.1	6	6
10-Nov-08	0.005	7.5	3.162E-08	8.3	5.012E-09	0	0	2	2	0.1	0.1	5	5
10-Dec-08	0.004	7.4	3.981E-08	8.1	7.943E-09	0.1	0.1	5	5	0.3	0.3	12	12
10-Jan-09	0.006	7.4	3.981E-08	8.1	7.943E-09	0.1	0.1	6	6	0.1	0.1	6	6
10-Feb-09	0.006	6.9	1.259E-07	7.8	1.585E-08	0.1	0.1	9	9	0.1	0.1	7	7
10-Mar-09	0.003	6	1.000E-06	7.3	5.012E-08	0.1	0.1	11	11	0.1	0.1	8	8
10-Apr-09	0.003	6.3	5.012E-07	7.9	1.259E-08	0.2	0.2	18	18	0.1	0.1	7	7
10-May-09	0.003	7.6	2.512E-08	8.4	3.981E-09	0.3	0.3	19	19	0.1	0.1	8	8
10-Jun-09	0.003	7.8	1.585E-08	8.2	6.310E-09	0	0	2	2	0.1	0.1	8	8
10-Jul-09	0.003	6.7	1.995E-07	8.2	6.310E-09	0.1	0.1	3	3	0.1	0.1	8	8
10-Aug-09	0.004	6.5	3.162E-07	7.9	1.259E-08	0.2	0.2	6	6	0.1	0.1	5	5
10-Sep-09	0.004	6.4	3.981E-07	7.6	2.512E-08	0	0	1	1	0.1	0.1	11	11
10-Oct-09	0.002	6.4	3.981E-07	7.5	3.162E-08	0	0	4	4	<QL	<QL	<QL	<QL
10-Nov-09	0.002	6.2	6.310E-07	7.6	2.512E-08	0	0	5	5	0	0	8	8
10-Dec-09	0.002	6.2	6.310E-07	7.7	1.995E-08	0	0	8	8	0	0	5	5
mean	0.01	6.8	1.541E-07	7.9	1.172E-08	0.1	0.1	4.7	5	0.1	0.1	6	6
maximum	0.014			8.5		0.4	0	19.0	19	0.4	0.4	13	13
minimum	0.002	6.0				0	0	1	1	0	0	5	5
permit limit		6.0		9.0		4.5	6.8	30	45	4.5	6.8	30	45
(mean performance / permit limit) * 100						2	1	15.6	10	3	2.1	20	13

Table 9 **DMR Data for GP Big Island (Outfall 901)**

Month Due	Color Rise (PCU)	Heat Rejected BTU/hr	BOD_5	
			average kg/d	max kg/d
10-Jan-07	10	14.2	246	465
10-Feb-07	6	20.6	298	593
10-Mar-07	9	9.1	301	787
10-Apr-07	6	16.7	369	860
10-May-07	7	15.3	305	762
10-Jun-07	5	38	219	633
10-Jul-07	9	17.8	188	830
10-Aug-07	29	18.4	285	937
10-Sep-07	21	12.5	257	836
10-Oct-07	16	15.8	256	600
10-Nov-07	21	18.5	351	648
10-Dec-07	21	21.6	506	1152
10-Jan-08	14	17.3	497	1078
10-Feb-08	14	22.1	523	1900
10-Mar-08	10	25.4	444	1358
10-Apr-08	8	19.5	365	1129
10-May-08	8	16.8	315	898
10-Jun-08	6	20.5	329	980
10-Jul-08	16	17	305	987
10-Aug-08	19	19.8	354	809
10-Sep-08	26	27.5	408	955
10-Oct-08	15	16.1	254	587
10-Nov-08	37	18.5	242	641
10-Dec-08	21	19.3	523	1026
10-Jan-09	14	17.6	354	1293
10-Feb-09	4	24.3	501	1268
10-Mar-09	6	20.4	462	852
10-Apr-09	5	18.1	177	434
10-May-09	3	12	271	890
10-Jun-09	3	14	362	2376
10-Jul-09	14	9.2	314	903
10-Aug-09	16	20.6	738	2299
10-Sep-09	19	6.8	410	1131
10-Oct-09	22	26.7	241	719
10-Nov-09	19	12.8	385	1233
10-Dec-09	11	10	721	2822
mean	14	18	363	996
maximum	37	38	738	2822
minimum	3	6.8	177	434
permit limit	70	70	2105	4210
(mean performance / permit limit) * 100	19	26	17	24

Attachment I

Mixing Zones

- **Mixing Zone Calculations (MIXER 2.1) (Outfall 001)**
- **Mixing Zone Calculations (MIXER 2.1) (Outfall 002)**
- **Diffuser Calculations (Outfall 003)**
- **Thermal Mixing Zone Study (Excerpt)**
- **Mixing Zone Diffuser Study Plan and Conditional Approval Letter**
- **Mixing Zone Diffuser Study Approval Letter**

Mixing Zone Predictions for GP Big Island (Outfall 001)

Effluent Flow = 0.12 MGD
Stream 7Q10 = 309 MGD
Stream 30Q10 = 354 MGD
Stream 1Q10 = 236 MGD
Stream slope = 0.00065 ft/ft
Stream width = 427 ft
Bottom scale = 1
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.2656 ft
Length = 313505.61 ft
Velocity = .8854 ft/sec
Residence Time = 4.098 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 48.8% of the 7Q10 is used.

Mixing Zone Predictions @ 30Q10

Depth = 1.3734 ft
Length = 292759.43 ft
Velocity = .9347 ft/sec
Residence Time = 3.625 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 55.17% of the 30Q10 is used.

Mixing Zone Predictions @ 1Q10

Depth = 1.0763 ft
Length = 359021.5 ft
Velocity = .7953 ft/sec
Residence Time = 125.4004 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than .8% of the 1Q10 is used.

Mixing Zone Predictions for GP Big Island (Outfall 002)

Effluent Flow = 3.65 MGD
Stream 7Q10 = 310 MGD
Stream 30Q10 = 354 MGD
Stream 1Q10 = 236 MGD
Stream slope = 0.00065 ft/ft
Stream width = 427 ft
Bottom scale = 1
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.2767 ft
Length = 311227.82 ft
Velocity = .8906 ft/sec
Residence Time = 4.0447 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 49.45% of the 7Q10 is used.

Mixing Zone Predictions @ 30Q10

Depth = 1.3816 ft
Length = 291300.55 ft
Velocity = .9384 ft/sec
Residence Time = 3.5927 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 55.67% of the 30Q10 is used.

Mixing Zone Predictions @ 1Q10

Depth = 1.086 ft
Length = 356353.84 ft
Velocity = .8 ft/sec
Residence Time = 123.7342 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than .81% of the 1Q10 is used.

Georgia-Pacific Corporatio.
Hwy. 501 North
P.O. Box 40
Big Island, Virginia 24526
Telephone (804) 299-5911

September 13, 1994 VA0003026

RECEIVED

SEP 13 1994

DEQ - WATER DIVISION
ROANOKE, VA

IND
NAO —
DWRM —

Thermal Mixing Zone Study

Mr. Neil Obenshain
Department of Environmental Quality
Water Division
West Central Regional Office
3015 Peters Creek Road
P. O. Box 7017
Roanoke, VA 24019-7017

Dear Mr. Obenshain:

Thank you again for meeting with Al Beshire and me on September 2nd. We are excited about the possibility of a new paper machine at the Big Island Mill. As I stated during our meeting, we should know in October if the project will proceed. We are encouraged to know that DEQ staff would be available to review a permit modification application in November. You indicated that the DEQ will proceed with reissuance of the existing permit and expects to have the permit reissued by November 30, 1994.

During our meeting we discussed how thermal mixing zones for Outfalls 001, 002 and 003 would be incorporated into the reissued permit. You indicated that the physical size of the mixing zones will be listed in the permit fact sheets. A thermal limit will be contained in the permit.

As we discussed, I have tabulated the maximum thermal discharges recorded for the period January 1992 through August 1994. Please note that the temperature values recorded for Outfalls 002 and 003 and the river are instantaneous readings. The value recorded for Outfall 001 is the average value from a continuous temperature probe. The three tables and the summary table (Table 5) from the Thermal Mixing Zone Study Report dated February 10, 1993 are enclosed. The maximum values are comparable to the study conditions.

After further consideration we still consider it appropriate to use the maximum thermal capacity of the equipment serviced by Outfalls 001 and 002 in calculating the size of the mixing zone. However, we are agreeable to modeling the maximum Δ MM BTU/HR value recorded over the last three years plus 10 percent at the critical river flow (7Q10) to project the size of the mixing zone to be listed in the permit.

With regard to a permit limit, we believe a Δ MM BTU/HR limit is most appropriate taking into account the variability of the flow rate and temperature of both the James River and Outfalls. Again we recommend the maximum recorded value plus ten percent.

As we have advised you, G-P is studying the expansion of the Big Island facility. As a result of the expansion, the mixing zones for temperature may need to be made larger. We understand that your office would prefer to do this after the next permit is issued by modifying the permit. We request that the following language be inserted in our permit to make it clear that we will be entitled to a larger mixing zone:

> This permit may be reopened to provide for a different mixing zone for temperature. Modification of the permit is subject to the provisions of 40 C.F.R. S 122.62 or Virginia equivalent. Virginia has determined that such an adjustment in the mixing zone, even if made larger, would be consistent with and authorized by the provisions of the Clean Water Act.

In addition, we indicated that the hydrogeological study of the wastewater treatment lagoons is nearly complete. The data indicates that the contribution of the lagoons is less than 5 Kg/D BOD. We expect that this report will be completed and submitted to the Department the week of September 12th.

We look forward to receipt of the draft permit shortly. We will advise you of any comments on the draft. We will also keep you advised on the status of our expansion study.

Very truly yours,

G T Griffith

Garry T. Griffith, P.E.
Environmental Manager

GTG/sb

Enclosures

cc: R. T. Allen - Atlanta GA030 11
A. W. Beshire - Atlanta GA030 48
U. E. Johnson - Atlanta GA030 48
J. W. Kertis
C. R. Judy
J. S. Johnson
GTG235.DOC

Thermal Mixing Zone Study

MAXIMUM THERMAL DISCHARGE DATA
1992 - 1994 (YTD)

OUTFALL 001

	EFFLUENT		RIVER		Δ MM BTU/HR.
WINTER *	FLOW (MGD)	TEMP. (° C)	FLOW (MGD)	TEMP. (° C)	
1992	1.2	25.7	21,731	12.6	9.8
1993	1.3	25.8	20,000	10.2	12.7
1994 (YTD AVG.)	1.1	26.2	11,119	13.3	8.8
SUMMER **	FLOW (MGD)	TEMP. (° C)	FLOW (MGD)	TEMP. (° C)	
1992	1.02	33.2	710	17.9	9.7
1993	0.47	45.6	679	24.4	6.2
1994 (YTD AVG.)	0.58	46.0	1,195	25.5	7.1

remove

* WINTER = DECEMBER - MARCH
** SUMMER = MAY - SEPTEMBER

(12.7)(0.10) = 1.27

12.7
1.27
13.97

MAXIMUM THERMAL DISCHARGE DATA
1992 - 1994 (YTD)

OUTFALL 002

	EFFLUENT		RIVER		Δ MM BTU/HR.
WINTER *	FLOW (MGD)	TEMP. (° C)	FLOW (MGD)	TEMP. (° C)	
1992	6.3	21.7	2,851	9.4	48.5
1993	6.0	18.4	590	5.8	47.3
1994 (YTD AVG.)	5.1	18.4	1,453	8.0	33.2
SUMMER **	FLOW (MGD)	TEMP. (° C)	FLOW (MGD)	TEMP. (° C)	
1992	6.3	25.6	4,921	18.1	29.6
1993	5.3	27.6	404	22.3	17.6
1994 (YTD AVG.)	4.8	28.6	757	22.9	17.1

* WINTER = DECEMBER - MARCH
** SUMMER = MAY - SEPTEMBER

48.5 (0.10) = 4.85
48.5
53.35
outfall 002

MAXIMUM THERMAL DISCHARGE DATA
1992 - 1994 (YTD)

OUTFALL 003

	EFFLUENT		RIVER		Δ MM BTU/HR.
WINTER *	FLOW (MGD)	TEMP. (° C)	FLOW (MGD)	TEMP. (° C)	
1992	5.7	19.3	3,158	10.8	30.3
1993	6.3	16.8	20,447	10.7	24.0
1994 (YTD AVG.)	7.1	17.3	13,558	12.6	20.9
SUMMER **	FLOW (MGD)	TEMP. (° C)	FLOW (MGD)	TEMP. (° C)	
1992	5.1	31.2	695	19.6	37.0
1993	6.1	33.1	800	24.8	31.7
1994 (YTD AVG.)	7.1	26.8	1,069	22.2	20.4

* WINTER = DECEMBER - MARCH
** SUMMER = MAY - SEPTEMBER

TABLE 5

THERMAL DISCHARGE DATA SUMMARY

OUTFALL	SEASON	EFFLUENT FLOW (MGD)	EFFLUENT TEMP. (°C)	RIVER FLOW (MGD)	RIVER TEMP (°C)	Δ MMBTU/HR[1]	ISOTHERM VOLUME ≥+1°C	ISOTHERM VOLUME ≥+2°C	ISOTHERM VOLUME ≥+3°C
001	Winter	0.10	21	2,862	5	1.00	198	0	0
	Spring	0.27	31	2,025	20	1.86	52	50	40
	Summer	1.19	34	552	25	6.70	21,277	2,217	1,456
	Fall	0.14	31	581	15	1.40	1,372	1,067	1,034
002	Winter	6.6	14	2,862	5	37.2	5,678	2,283	635
	Spring	6.1	26	2,025	20	22.9	3,822	707	191
	Summer	5.9	31	552	26	18.5	18,927	7,783	2,700
	Fall	6.4	24	581	15	36.0	23,570	14,479	5,652
003	Winter	4.7	15	2,862	5	24.4	35,455[2]	6,172[2]	1,500
	Spring	5.8	26	2,025	21	18.1	747	384	223
	Summer	5.9	30	552	27	11.1	6,231	384	62
	Fall	5.7	24	581	17	25.0	12,394	1,798	842

Notes:

1. ΔMMBTU/HR (or change in effluent heat in million BTUs per hour) = [(Effluent flow in MGD) x 0.3475] x [(Effluent Temp. in °C) - (River Temp. in °C)] x 1.8.
2. Actual values are higher due to inability to measure depths greater than 8 feet.

Job Number 31367

February 10, 1993

Thermal Mixing Zone Study

feeders and other nonmobile organisms, spatial distribution of organisms and reinforcement of weakened populations are enhanced, and embryos and larvae of some fish species develop while drifting [11]. Anadromous and catadromous species must be able to reach suitable spawning areas. Their young (and in some cases the adults) must be assured a return route to their growing and living areas. Many species make migrations for spawning and other purposes. Barriers or blocks that prevent or interfere with these types of essential transport and movement can be created by water with inadequate chemical or physical quality.

As explained above, a State regulatory agency may decide to deny a mixing zone in a site-specific case. For example, denial should be considered when bioaccumulative pollutants are in the discharge. The potential for a pollutant to bioaccumulate in living organisms is measured by (1) the bioconcentration factor (BCF), which is chemical-specific and describes the degree to which an organism or tissue can acquire a higher contaminant concentration than its environment (e.g., surface water); (2) the duration of exposure; and (3) the concentration of the chemical of interest. While any BCF value greater than 1 indicates that bioaccumulation potential exists, bioaccumulation potential is generally not considered to be significant unless the BCF exceeds 100 or more. Thus, a chemical that is discharged to a receiving stream, resulting in low concentrations, and that has a low BCF value will not create a bioaccumulation hazard. Conversely, a chemical that is discharged to a receiving stream, resulting in a low concentration but having a high BCF value, may cause in a bioaccumulation hazard. Also, some chemicals of relatively low toxicity, such as zinc, will bioconcentrate in fish without harmful effects resulting from human consumption.

Another example of when a regulator should consider prohibiting a mixing zone is in situations where an effluent is known to attract biota. In such cases, provision of a continuous zone of passage around the mixing area will not serve the purpose of protecting aquatic life. A review of the technical literature on avoidance/attraction behavior revealed that the majority of toxicants elicited an avoidance or neutral response at low concentrations [13]. However, some chemicals did elicit an attractive response, but the data were not sufficient to support any predictive methods. Temperature can be an attractive force and may counter an avoidance response to a pollutant, resulting in attraction to the toxicant discharge. Innate behavior such as migration may also supersede an avoidance response and cause fish to incur a significant exposure.

4.3.2 Minimizing the Size of Mixing Zones

Concentrations above the chronic criteria are likely to prevent sensitive taxa from taking up long-term residence in the mixing zone. In this regard, benthic organisms and territorial organisms are likely to be of greatest concern. The higher the concentrations occurring within an isopleth, the more taxa are likely to be excluded, thereby affecting the structure and function of the ecological community. It is thus important to minimize the overall size of the mixing zone and the size of elevated concentration isopleths within the mixing zone.

4.3.3 Prevention of Lethality to Passing Organisms

The *Water Quality Standards Handbook* [14] indicates that whether to establish a mixing zone policy is a matter of State discretion, but that any State policy allowing for mixing zones must be consistent with the CWA and is subject to approval of the Regional Administrator. The handbook provides additional discussion regarding the basis for a State mixing zone policy.

Lethality is a function of the magnitude of pollutant concentrations and the duration an organism is exposed to those concentrations. Requirements for wastewater plumes that tend to attract aquatic life should incorporate measures to reduce the toxicity (e.g., via pretreatment, dilution) to minimize lethality or any irreversible toxic effects on aquatic life.

EPA's water quality criteria provide guidance on the magnitude and duration of pollutant concentrations causing lethality. The criterion maximum concentration (CMC) is used as a means to prevent lethality or other acute effects. As explained in Appendix D, the CMC is a toxicity level and should not be confused with an LC_{50} level. The CMC is defined as one-half of the final acute value for specific toxicants and 0.3 acute toxic unit (TU_a) for effluent toxicity (see Chapter 2). The CMC describes the condition under which lethality will not occur if the duration of the exposure to the CMC level is less than 1 hour. The CMC for whole effluent toxicity is intended to prevent lethality or acute effects in the aquatic biota. The CMC for individual toxicants prevents acute effects in all but a small percentage of the tested species. Thus, the areal extent and concentration isopleths of the mixing zone must be such that the 1-hour average exposure of organisms passing through the mixing zone is less than the CMC. The organism must be able to pass through quickly or flee the high-concentration area. The objective of developing water quality recommendations for mixing zones is to provide time-exposure histories that produce negligible or no measurable effects on populations of critical species in the receiving system.

Lethality to passing organisms can be prevented in the mixing zone in one of four ways. The first method is to prohibit concentrations in excess of the CMC in the pipe itself, as measured directly at the end of the pipe. As an example, the CMC should be met in the pipe whenever a continuous discharge is made to an intermittent stream. The second approach is to require that the CMC be met within a very short distance from the outfall during chronic design-flow conditions for receiving waters (see Section 4.4.2).

If the second alternative is selected, hydraulic investigations and calculations indicate that the use of a high-velocity discharge with an initial velocity of 3 meters per second, or more, together with a mixing zone spatial limitation of 50 times the discharge length scale in any direction, should ensure that the CMC is met within a few minutes under practically all conditions. The discharge length scale is defined as the square root of the cross-sectional area of any discharge pipe.

A third alternative (applicable to any waterbody) is not to use a high-velocity discharge. Rather the discharger should provide data to the State regulatory agency showing that the most restrictive of the following conditions are met for each outfall:

- The CMC should be met within 10 percent of the distance from the edge of the outfall structure to the edge of the regulatory mixing zone in any spatial direction.

- The CMC should be met within a distance of 50 times the discharge length scale in any spatial direction. In the case of a multiport diffuser, this requirement must be met for each port using the appropriate discharge length scale of that port. This restriction will ensure a dilution factor of at least 10 within this distance under all possible circumstances, including situations of severe bottom interaction, surface interaction, or lateral merging.

- The CMC should be met within a distance of five times the local water depth in any horizontal direction from any discharge outlet. The local water depth is defined as the natural water depth (existing prior to the installation of the discharge outlet) prevailing under mixing zone design conditions (e.g., low flow for rivers). This restriction will prevent locating the discharge in very shallow environments or very close to shore, which would result in significant surface and bottom concentrations.

A fourth alternative (applicable to any waterbody) is for the discharger to provide data to the State regulatory agency showing that a drifting organism would not be exposed to 1-hour average concentrations exceeding the CMC, or would not receive harmful exposure when evaluated by other valid toxicological analysis, as discussed in Section 2.2.2. Such data should be collected during environmental conditions that replicate critical conditions.

For the third and fourth alternatives, examples of such data include monitoring studies, except for those situations where collecting chemical samples to develop monitoring data would be impractical, such as at deep outfalls in oceans, lakes, or embayments. Other types of data could include field tracer studies using dye, current meters, other tracer materials, or detailed analytical calculations, such as modeling estimations of concentration or dilution isopleths.

The Water Quality Criteria—1972 [11] outlines a method, applicable to the fourth alternative, to determine whether a mixing zone is tolerable for a free-swimming or drifting organism. The method incorporates mortality rates (based on toxicity studies for the pollutant of concern and a representative organism) along with the concentration isopleths of the mixing zone and the length of time the organism may spend in each isopleth. The intent of the method is to prevent the actual time of exposure from exceeding the exposure time required to elicit an effect [10]:

$$\Sigma\left[\frac{T(n)}{ET(X) \text{ at } C(n)}\right] \leq 1$$

where T(n) is the exposure time an organism is in isopleth n, and ET(X) is the "effect time." That is, ET(X) is the exposure time required to produce an effect (including a delayed effect) in X percent of organisms exposed to a concentration equal to C(n), the concentration in isopleth n. ET(X) is experimentally determined; the effect is usually mortality. If the summation of ratios of exposure time to effect time is less than 1, then the percent effect will not occur.

4.3.4 Prevention of Bioaccumulation Problems for Human Health

States are not required to allow mixing zones. Where unsafe fish tissue levels or other evidence indicates a lack of assimilative capacity in a particular waterbody for a bioaccumulative pollutant, care should be taken in calculating discharge limits for this pollutant or the additivity of multiple pollutants. In particular, relaxing discharge limits because of the provision of a mixing zone may not be appropriate in this situation.

4.4 MIXING ZONE ANALYSES

Proper design of a mixing zone study for a particular waterbody requires estimation of the distance from the outfall to the point where the effluent mixes completely with the receiving water. The boundary is usually defined as the location where the concentrations across a transect of the waterbody differ by less than 5 percent. The boundary can be determined based on the results of a tracer study or the use of mixing zone models. Both procedures, along with simple order-of-magnitude dilution calculations, are discussed in the following subsections.

If the distance to complete mixing is insignificant, then mixing zone modeling is not necessary and the fate and transport models described in Section 4.5 can be used to perform the WLA. **It is important to remember that the assumption of complete mixing is not a conservative assumption for toxic discharges; an assumption of minimal mixing is the conservative approach.** If completely mixed conditions do not occur within a short distance of the outfall, the WLA study should rely on mixing zone monitoring and modeling. Just as in the case of completely mixed models, mixing zone analysis can be performed using both steady-state and dynamic techniques. State requirements regarding the mixing zone will determine how water quality criteria are used in the TMDL.

This section is divided into five subsections. The first discusses recommendations for outfall designs and means to maximize initial dilution. The second provides a brief description of the four major waterbody types and the critical design period when mixing zone analysis should be performed for each. The third provides a brief description of tracer studies and how they may be used to define a mixing zone. The fourth and fifth subsections discuss simplified methods and sophisticated models to predict the two stages of mixing (i.e., discharge-induced and ambient-induced mixing). For a detailed explanation of the mechanisms involved in estimating both stages of mixing, two references are recommended, Holley and Jirka [15] and Fischer et al. [16]. Although the models presented in Sections 4.4.4 and 4.4.5 simplify the mixing process, the assessor should have an understanding of the basic physical concepts governing mixing to use these

K. The board is not required to conduct a use attainability analysis under this chapter whenever designating uses which include those specified in subsection A of this section.

9 VAC 25-260-20. General criteria.

A. All state waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life.

Specific substances to be controlled include, but are not limited to: floating debris, oil, scum, and other floating materials; toxic substances (including those which bioaccumulate); substances that produce color, tastes, turbidity, odors, or settle to form sludge deposits; and substances which nourish undesirable or nuisance aquatic plant life. Effluents which tend to raise the temperature of the receiving water will also be controlled.

B. Mixing zones.

1. The board shall use mixing zone concepts in evaluating permit limits for acute and chronic standards in 9 VAC 25-260-140 B. No mixing zone established by the board shall:

a. Prevent movement of passing or drifting aquatic organisms through the water body in question;

b. Cause acute lethality to passing or drifting aquatic organisms;

c. Be used for, or considered as, a substitute for minimum treatment technology required by the Clean Water Act and other applicable state and federal laws;

d. Constitute more than one half of the width of the receiving watercourse nor constitute more than one third of the area of any cross section of the receiving watercourse;

e. Extend downstream at any time a distance more than five times the width of the receiving watercourse at the point of discharge.

2. An allocated impact zone may be allowed within a mixing zone. This zone is the area of initial dilution of the effluent with the receiving water where the concentration of the effluent will be its greatest in the water column. Mixing within these allocated impact zones shall be as quick as practical and shall be sized to prevent lethality to passing or drifting aquatic organisms.

3. Mixing zones shall be determined such that acute standards are met outside the allocated impact zone and chronic standards are met at the edge of the mixing zone (see 9 VAC 25-260-140 A and B).

4. The board may waive the requirements of subdivisions 1 d and e of this subsection if:

a. The board determines on a case-by-case basis that a complete mix assumption is appropriate; or

b. A discharger provides an acceptable demonstration of:

(1) Information defining the actual boundaries of the mixing zone in question; and

(2) Information and data proving no violation of subdivisions 1 a, b and c of this subsection by the mixing zone in question.

GEORGIA-PACIFIC CORPORATION
BIG ISLAND MILL

CHEMICAL MIXING ZONE STUDY PLAN

DEQ - WCRO
OCT 2 1 2002
RECEIVED

Prepared for:

Georgia-Pacific Corporation
P.O. Box 40
Big Island, Virginia 24526

OLVER
INCORPORATED

Prepared by:

Olver Incorporated
1116 South Main Street, Suite 100
Blacksburg, Virginia 24060

October 17, 2002
Project Number: 11309.17

```
RMIX2 PREDICTION FILE:
22222222222222222222222222222222222222222222222222222222222222222222222222222
                        CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX2:                                            Subsystem version:
 Submerged Multiport Diffuser Discharges    CORMIX_v.3.20_____September_1996
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------

CASE DESCRIPTION
 Site name/label:          Georgia-Pacific^003^Diffuser
 Design case:              Expected^value^of^ammonia^used^as^Co
 FILE NAME:                cormix\sim\gp3_798 .cx2              at 7Q10 flow
 Time of Fortran run:      07/23/98--13:02:33

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS     =     98.67  AS     =    436.12  QA     =      12.95  ICHREG= 1
 HA     =      4.42  HD     =      4.45
 UA     =      .030  F      =      .043  USTAR = .2177E-02
 UW     =     2.000  UWSTAR= .2198E-02
 Uniform density environment
 STRCND=  U          RHOAM =  996.4861

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= unidirectional_perpendicular
 BANK   =  RIGHT     DISTB =      33.10  YB1    =      23.20  YB2    =      43.00
 LD     =     19.80  NOPEN =   15         SPAC   =      1.41
 D0     =      .152  A0     =      .018  H0     =        .30
 Nozzle/port arrangement:  unidirectional_without_fanning
 GAMMA =     90.00  THETA =      30.00  SIGMA =        .00  BETA   =      90.00
 U0     =     2.192  Q0     =       .364         = .3640E+00
 RHO0   =  995.3405  DRHO0 = .1146E+01  GP0    = .1127E-01
 C0     = .2560E+01  CUNITS=  ppm
 IPOLL =  2          KS     = .0000E+00  KD     = .6000E-05

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0     = .1838E-01  m0     = .4030E-01  j0     = .2073E-03  SIGNJ0=       1.0
 Associated 2-d length scales (meters)
 lQ=B   =      .008  lM     =      11.48  lm     =      45.69
 lmp    =  99999.00  lbp    =   99999.00  la     =   99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0     = .3640E+00  M0     = .7980E+00  J0     = .4104E-02
 Associated 3-d length scales (meters)
 LQ     =       .41  LM     =      13.18  Lm     =      30.08  Lb     =     156.64
                                          Lmp    =   99999.00  Lbp    =   99999.00

NON-DIMENSIONAL PARAMETERS
 FR0    =    225.46  FRD0   =      52.95  R      =      73.81
 (slot)              (port/nozzle)

FLOW CLASSIFICATION
 2222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU2    2
 2  Applicable layer depth HS =     4.45  2
 2222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0     = .2560E+01  CUNITS=  ppm
 NTOX   =  1         CMC    = .7231E+00  CCC    =  CSTD
 NSTD   =  1         CSTD   = .1566E+00
```

```
REGMZ =  1
REGSPC=  3          XREG   =        .00  WREG   =        .00  AREG   =    145.23
XINT   =    4666.00  XMAX   =    4666.00

:-Y-Z COORDINATE SYSTEM:
   ORIGIN is located at the bottom and the diffuser mid-point:
       33.10 m  from the RIGHT bank/shore.
   X-axis points downstream, Y-axis points to left, Z-axis points upward.
ISTEP = 50 display intervals per module
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X         Y        Z         S        C        BV        BH
      .00       .00      .30       1.0  .256E+01     .01      9.90

END OF MOD201: DIFFUSER DISCHARGE MODULE
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =     4.45m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)

       X         Y        Z         S        C        BV        BH
      .00       .00      .30       1.0  .256E+01     .01      9.90
** CMC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below CMC value of  .723E+00
   in the current prediction interval.
 This is the extent of the TOXIC DILUTION ZONE.
      .20       .00      .34       3.7  .687E+00     .09      9.67
      .40       .00      .38       4.9  .527E+00     .18      9.46
      .59       .00      .42       5.7  .447E+00     .27      9.26
      .79       .00      .45       6.5  .397E+00     .36      9.07
      .99       .00      .49       7.1  .361E+00     .44      8.89
     1.19       .00      .53       7.7  .333E+00     .53      8.72
     1.39       .00      .57       8.2  .312E+00     .62      8.57
     1.58       .00      .61       8.7  .294E+00     .71      8.41
     1.78       .00      .65       9.2  .279E+00     .80      8.27
     1.98       .00      .68       9.6  .266E+00     .89      8.14
     2.18       .00      .72      10.0  .255E+00     .98      8.01
     2.38       .00      .76      10.4  .245E+00    1.07      7.89
     2.57       .00      .80      10.8  .236E+00    1.16      7.77
     2.77       .00      .84      11.2  .229E+00    1.25      7.66
```

2.97	.00	.	11.6	.221E+00	1.33	7.56
3.17	.00	.92	11.9	.215E+00	1.42	7.46
3.37	.00	.95	12.2	.209E+00	1.51	7.36
3.56	.00	.99	12.6	.204E+00	1.60	7.27
3.76	.00	1.03	12.9	.199E+00	1.69	7.18
3.96	.00	1.07	13.2	.194E+00	1.78	7.10
4.16	.00	1.11	13.5	.190E+00	1.87	7.02
4.36	.00	1.15	13.8	.186E+00	1.96	6.94
4.55	.00	1.19	14.1	.182E+00	2.05	6.87
4.75	.00	1.22	14.4	.178E+00	2.14	6.80
4.95	.00	1.26	14.6	.175E+00	2.22	6.74
5.15	.00	1.30	14.9	.172E+00	2.31	6.67
5.35	.00	1.34	15.2	.169E+00	2.40	6.61
5.54	.00	1.38	15.4	.166E+00	2.49	6.56
5.74	.00	1.42	15.7	.163E+00	2.58	6.50
5.94	.00	1.45	15.9	.161E+00	2.67	6.45
6.14	.00	1.49	16.2	.158E+00	2.76	6.40

* WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of .157E+00 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

6.34	.00	1.53	16.4	.156E+00	2.85	6.36
6.53	.00	1.57	16.7	.154E+00	2.94	6.32
6.73	.00	1.61	16.9	.151E+00	3.03	6.28
6.93	.00	1.65	17.1	.149E+00	3.11	6.25
7.13	.00	1.69	17.4	.147E+00	3.20	6.22
7.33	.00	1.72	17.6	.146E+00	3.29	6.19
7.52	.00	1.76	17.8	.144E+00	3.38	6.16
7.72	.00	1.80	18.0	.142E+00	3.47	6.14
7.92	.00	1.84	18.2	.140E+00	3.56	6.12
8.12	.00	1.88	18.5	.139E+00	3.65	6.10
8.32	.00	1.92	18.7	.137E+00	3.74	6.09
8.51	.00	1.96	18.9	.136E+00	3.83	6.07
8.71	.00	1.99	19.1	.134E+00	3.92	6.06
8.91	.00	2.03	19.3	.133E+00	4.00	6.05
9.11	.00	2.07	19.5	.131E+00	4.09	6.05
9.31	.00	2.11	19.7	.130E+00	4.18	6.04
9.50	.00	2.15	19.9	.129E+00	4.27	6.03
9.70	.00	2.19	20.1	.127E+00	4.36	6.03
9.90	.00	2.22	20.3	.126E+00	4.45	6.03

Cumulative travel time = 72. sec

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

Phase 1: Vertically mixed, Phase 2: Re-stratified

Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

Profile definitions:
- BV = top-hat thickness, measured vertically
- BH = Gaussian 1/e (37%) half-width in horizontal plane normal to trajectory
- ZU = upper plume boundary (Z-coordinate)
- ZL = lower plume boundary (Z-coordinate)
- S = hydrodynamic centerline dilution
- C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH	
9.90	.00	4.45	20.3	.126E+00	4.45	6.80	
20.51	.00	4.45	21.6	.118E+00	2.47	13.70	dilution needed to avoid limits
31.12	.00	4.45	22.8	.112E+00	2.03	18.37	24.05 22 25.26
41.73	.00	4.45	24.0	.106E+00	1.80	22.62	RMZ width
52.34	.00	4.45	25.1	.101E+00	1.66	26.66	
62.95	.00	4.45	26.2	.964E-01	1.55	30.59	
73.56	.00	4.45	27.2	.924E-01	1.47	34.45	
84.17	.00	4.45	28.2	.889E-01	1.41	38.26	
94.78	.00	4.45	29.2	.857E-01	1.36	42.04	
105.39	.00	4.45	30.1	.827E-01	1.32	45.80	
116.00	.00	4.45	31.0	.801E-01	1.28	49.55	
126.61	.00	4.45	31.9	.776E-01	1.25	53.28	
137.22	.00	4.45	32.7	.753E-01	1.22	57.01	
147.83	.00	4.45	33.5	.731E-01	1.19	60.74	
158.44	.00	4.45	34.4	.711E-01	1.17	64.47	
169.05	.00	4.45	35.1	.692E-01	1.15	68.20	
179.66	.00	4.45	35.9	.674E-01	1.13	71.93	
190.27	.00	4.45	36.7	.658E-01	1.11	75.66	
200.88	.00	4.45	37.4	.642E-01	1.10	79.40	
211.49	.00	4.45	38.1	.627E-01	1.08	83.15	
222.10	.00	4.45	38.9	.612E-01	1.07	86.89	
232.71	.00	4.45	39.6	.599E-01	1.05	90.65	
243.32	.00	4.45	40.2	.586E-01	1.04	94.41	
253.93	.00	4.45	40.9	.573E-01	1.03	98.18	
264.54	.00	4.45	41.6	.561E-01	1.02	101.95	
275.15	.00	4.45	42.2	.550E-01	1.01	105.73	
285.76	.00	4.45	42.9	.539E-01	1.00	109.52	
296.37	.00	4.45	43.5	.528E-01	.99	113.32	
306.98	.00	4.45	44.2	.518E-01	.98	117.12	
317.59	.00	4.45	44.8	.508E-01	.97	120.93	
328.20	.00	4.45	45.4	.499E-01	.96	124.74	
338.81	.00	4.45	46.0	.490E-01	.95	128.57	
349.42	.00	4.45	46.6	.481E-01	.94	132.40	
360.03	.00	4.45	47.2	.472E-01	.93	136.24	
370.64	.00	4.45	47.7	.464E-01	.93	140.08	
381.25	.00	4.45	48.3	.456E-01	.92	143.93	
391.86	.00	4.45	48.9	.448E-01	.91	147.79	
402.47	.00	4.45	49.4	.440E-01	.91	151.66	
413.08	.00	4.45	50.0	.433E-01	.90	155.53	
423.69	.00	4.45	50.5	.425E-01	.89	159.41	
434.30	.00	4.45	51.1	.418E-01	.89	163.30	
444.91	.00	4.45	51.6	.412E-01	.88	167.19	
455.52	.00	4.45	52.1	.405E-01	.87	171.09	
466.13	.00	4.45	52.7	.398E-01	.87	175.00	
476.74	.00	4.45	53.2	.392E-01	.86	178.91	
487.35	.00	4.45	53.7	.386E-01	.86	182.83	
497.96	.00	4.45	54.2	.380E-01	.85	186.76	
508.57	.00	4.45	54.7	.374E-01	.85	190.69	
519.18	.00	4.45	55.2	.368E-01	.84	194.63	
529.79	.00	4.45	55.7	.362E-01	.84	198.58	
540.40	.00	4.45	56.2	.357E-01	.83	202.53	

Cumulative travel time = 40749. sec 11.3 hours

ND OF MOD251: DIFFUSER PLUME IN CO-FLOW

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* End of NEAR-FIELD REGION (NFR) **

The initial plume WIDTH values in the next far-field module will be

```
 CORRECTED by a factor     .1 to conserve the mass f  .. in the far-field!

 The LIMITING DILUTION (given by ambient flow/discharge ratio) is:    36.6
   This value is below the computed dilution of    56.2 at the end
   of the NFR.
   Mixing for this discharge configuration is constrained by the ambient flow.

 The previous module predictions are unreliable since the limiting dilution
   cannot be exceeded for this unstable shallow discharge configuration.

 A subsequent module (MOD281) will predict the properties of the
   cross-sectionally fully mixed plume with limiting dilution and will
   compute a POSSIBLE UPSTREAM WEDGE INTRUSION.
 Bottom coordinate for FAR-FIELD is determined by average depth, ZFB =   .03m
-----------------------------------------------------------------------------
3EGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

 The DOWNSTREAM flow field for this unstable shallow water discharge is
     VERTICALLY FULLY MIXED.
 The mixing is controlled by the limiting dilution =     36.6

 Channel DENSIMETRIC FROUDE NUMBER (FCHAN) for this mixed flow =      .80

 No upstream wedge intrusion takes place since FCHAN exceeds the critical
   value of 0.7.
        X         Y        Z         S        C         BV       BH       ZU       ZL
     540.40    -33.10    4.45     36.6  .548E-01    4.45    98.67    4.45     .03
 Cumulative travel time =        40749. sec

 VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION
-----------------------------------------------------------------------------
 ** REGULATORY MIXING ZONE BOUNDARY is within the Near-Field Region (NFR) **
-----------------------------------------------------------------------------
CORMIX2: Submerged Multiport Diffuser Discharges       End of Prediction File
2222222222222222222222222222222222222222222222222222222222222222222222222222
```

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222
                         CORNELL MIXING ZONE EXPERT SYSTEM
Subsystem CORMIX2:                                            Subsystem version:
 Submerged Multiport Diffuser Discharges    CORMIX_v.3.20_____September_1996
----------------------------------------------------------------------------
----------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:           GP003_Diffuser
 Design case:               use^antideg^baseline^for^ammonia^CCC
 FILE NAME:                 cormix\sim\gpdiff3 .cx2
 Time of Fortran run:       07/22/98--13:21:33                        1Q10

ENVIRONMENT PARAMETERS (metric units)
 Bounded section                                          rec. water flow
 BS     =     98.67  AS     =    436.12  QA     =     10.68  ICHREG= 1
 HA     =      4.42  HD     =      4.45 water depth
 UA ambient velocity  .024  F     =    .043  USTAR = .1797E-02
 UW     =     2.000  UWSTAR= .2198E-02
 Uniform density environment
 STRCND=  U          RHOAM =  996.4861

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= unidirectional_perpendicular
 BANK   =  RIGHT     DISTB =      33.10  YB1    =     23.20  YB2    =     43.00
 LD     =     19.80  NOPEN =   15        SPAC   =      1.41
 D0     =      .152  A0     =      .018  H0     =       .30
 Nozzle/port arrangement:  unidirectional_without_fanning
 GAMMA =      90.00  THETA =      30.00  SIGMA =        .00  BETA   =     90.00
 U0     =     2.192  Q0     =      .364         = .3640E+00 volumetric discharge flow rate
 RHO0   =  995.3405  DRHO0 = .1146E+01  GP0    = .1127E-01
 C0     = .4200E+01  CUNITS=  degC
 IPOLL =  3          KS     = .2000E-05  KD     = .0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0     = .1838E-01  m0     = .4030E-01  j0     = .2073E-03  SIGNJ0=        1.0
 Associated 2-d length scales (meters)
 lQ=B   =      .008 lM     =      11.48  lm     =     67.14
 lmp    =  99999.00 lbp    =   99999.00  la     =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0     = .3640E+00  M0     = .7980E+00  J0     = .4104E-02
 Associated 3-d length scales (meters)
 LQ     =       .41  LM     =      13.18  Lm     =     36.46  Lb     =    279.05
                                         Lmp    =  99999.00  Lbp    =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0    =    225.46  FRD0   =      52.95  R      =     89.48
 (slot)              (port/nozzle)

FLOW CLASSIFICATION
 2222222222222222222222222222222222222222222
 2  Flow class (CORMIX2)        =    MU2     2
 2  Applicable layer depth HS =     4.45   2
 2222222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0     = .4200E+01  CUNITS=  degC mg/l
 NTOX   =  1         CMC    = .7246E+00  CCC    =  CSTD  )  Ammonia Antidegradation
 NSTD   =  1         CSTD   = .1156E+00                  )  Baselines
```

```
 REGMZ =   1
 REGSPC=   1          XREG   =     793.35  WREG   =        .00  AREG   =          .00
 XINT  =    4735.00   XMAX   =    4735.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
        33.10 m  from the RIGHT bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 20 display intervals per module

NOTE on dilution/concentration values for this HEATED DISCHARGE (IPOLL=3):
   S  = hydrodynamic dilutions, include buoyancy (heat) loss effects, but
        provided plume has surface contact
   C  = corresponding temperature values (always in "degC"!),
        include heat loss, if any
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

      X         Y        Z        S        C         BV        BH
      .00       .00      .30      1.0  .420E+01      .01       9.90

END OF MOD201: DIFFUSER DISCHARGE MODULE
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =     4.45m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)

      X         Y        Z        S        C         BV        BH
      .00       .00      .30      1.0  .420E+01      .01       9.90
      .49 1.6   .00      .40      5.1  .817E+00      .22       9.33
** CMC HAS BEEN FOUND **
The pollutant concentration in the plume falls below CMC value of  .725E+00
  in the current prediction interval.
This is the extent of the TOXIC DILUTION ZONE.
      .99       .00      .49      6.9  .613E+00      .44       8.85
     1.48       .00      .59      8.2  .514E+00      .67       8.42
     1.98       .00      .69      9.3  .452E+00      .89       8.06
     2.47       .00      .78     10.3  .409E+00     1.11       7.73
     2.97       .00      .88     11.1  .377E+00     1.33       7.45
     3.46       .00      .97     12.0  .351E+00     1.56       7.20
     3.96       .00     1.07     12.7  .330E+00     1.78       6.97
```

4.45	.00	1.	13.4	.313E+00	2.00	6.77
4.95	.00	1.26	14.1	.298E+00	2.22	6.59
5.44	.00	1.36	14.7	.285E+00	2.45	6.43
5.94	.00	1.45	15.3	.274E+00	2.67	6.29
6.43	.00	1.55	15.9	.264E+00	2.89	6.17
6.93	.00	1.65	16.5	.255E+00	3.11	6.08
7.42	.00	1.74	17.0	.246E+00	3.34	6.00
7.92	.00	1.84	17.6	.239E+00	3.56	5.94
8.41	.00	1.94	18.1	.232E+00	3.78	5.90
8.91	.00	2.03	18.6	.226E+00	4.00	5.87
9.40	.00	2.13	19.1	.220E+00	4.23	5.86
9.90	.00	2.22	19.5	.215E+00	4.45	5.85

Cumulative travel time = 72. sec

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

Phase 1: Vertically mixed, Phase 2: Re-stratified

Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

Profile definitions:
- BV = top-hat thickness, measured vertically
- BH = Gaussian 1/e (37%) half-width in horizontal plane normal to trajectory
- ZU = upper plume boundary (Z-coordinate)
- ZL = lower plume boundary (Z-coordinate)
- S = hydrodynamic centerline dilution
- C = centerline concentration (includes reaction effects, if any)

X	Y	Z	S	C	BV	BH
9.90	.00	4.45	19.5	.215E+00	4.45	6.60
51.03	.00	4.45	24.4	.172E+00	1.70	25.70
92.17	.00	4.45	28.4	.148E+00	1.41	40.66
133.30	.00	4.45	31.9	.132E+00	1.28	55.25
174.43 572'	.00	4.45	35.1	.120E+00	1.19	69.82

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard
or CCC value of .116E+00 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality
standard or CCC value.

215.56	.00	4.45	38.0	.110E+00	1.13	84.46
256.70	.00	4.45	40.7	.103E+00	1.08	99.19
297.83	.00	4.45	43.3	.971E-01	1.04	114.04
338.96	.00	4.45	45.7	.920E-01	1.00	128.99
380.09	.00	4.45	47.9	.876E-01	.97	144.07
421.23	.00	4.45	50.1	.838E-01	.95	159.25
462.36	.00	4.45	52.2	.805E-01	.92	174.54
503.49	.00	4.45	54.2	.775E-01	.90	189.94
544.62	.00	4.45	56.1	.748E-01	.88	205.43
585.76	.00	4.45	58.0	.724E-01	.87	221.03
626.89	.00	4.45	59.8	.702E-01	.85	236.71
668.02	.00	4.45	61.6	.682E-01	.83	252.49
709.15	.00	4.45	63.3	.664E-01	.82	268.35
750.29	.00	4.45	64.9	.647E-01	.81	284.30
791.42	.00	4.45	66.5	.631E-01	.79	300.33
832.55	.00	4.45	68.1	.617E-01	.78	316.43

Cumulative travel time = 74317. sec

```
END OF MOD251: DIFFUSER PLUME IN CO-FLOW
-----------------------------------------------------------------------------
** End of NEAR-FIELD REGION (NFR) **

 The initial plume WIDTH values in the next far-field module will be
  CORRECTED by a factor  1.41 to conserve the mass flux in the far-field!

 The LIMITING DILUTION (given by ambient flow/discharge ratio) is:    30.4
   This value is below the computed dilution of    68.1 at the end
   of the NFR.
   Mixing for this discharge configuration is constrained by the ambient flow.

 The previous module predictions are unreliable since the limiting dilution
   cannot be exceeded for this unstable shallow discharge configuration.

 A subsequent module (MOD281) will predict the properties of the
   cross-sectionally fully mixed plume with limiting dilution and will
   compute a POSSIBLE UPSTREAM WEDGE INTRUSION.
 Bottom coordinate for FAR-FIELD is determined by average depth, ZFB =   .03m
-----------------------------------------------------------------------------
BEGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

 The DOWNSTREAM flow field for this unstable shallow water discharge is
     VERTICALLY FULLY MIXED.
 The mixing is controlled by the limiting dilution =     30.4

 Channel DENSIMETRIC FROUDE NUMBER (FCHAN) for this mixed flow =      .60

 An UPSTREAM INTRUDING WEDGE is formed along the surface/pycnocline.

 UPSTREAM WEDGE INTRUSION PROPERTIES in bounded channel (laterally uniform):
       Wedge length                              =      26.17 m
       X-Position of wedge tip                   =     806.38 m
       Thickness at discharge (end of NFR)       =       1.28 m
        (Wedge thickness gradually decreases to zero at wedge tip.)

       X         Y        Z        S       C        BV       BH       ZU      ZL
    832.55   -33.10    4.45     30.4  .138E+00   4.45    98.67    4.45     .03
 Cumulative travel time =       74317. sec   20.64h

 VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION
-----------------------------------------------------------------------------
 ** REGULATORY MIXING ZONE BOUNDARY is within the Near-Field Region (NFR) **
-----------------------------------------------------------------------------
CORMIX2: Submerged Multiport Diffuser Discharges        End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222222
```

France,Becky

From: France,Becky
Sent: Tuesday, September 16, 2008 9:39 AM
To: Brockenbrough,Allan
Subject: RE: GA Pacific Chemical Mixing Zone Study Plan

Attachments: Fact Sheet GP 2005 Final Version Revised.doc; Fact Sheet Flow MEMORANDUM GP 2005.doc

Thank you for taking the time to thoroughly evaluate this study report. The 7Q10 and 1Q10 values that I have for the 2005 reissuance permit correlate with the study numbers. The Fact Sheet went through several revisions, and my copy must be different from yours. The final revision date was 6/14/05. I am sorry that the most recent copy did not get sent to your office. I have attached a copy of the main part of the 2005 Fact Sheet.

-act Sheet GP 2005
Final Versi...

Fact Sheet Flow
EMORANDUM GP

Again, thank you for your help analyzing the study information.

From: Brockenbrough,Allan
Sent: Tuesday, September 16, 2008 9:10 AM
To: France,Becky
Subject: RE: GA Pacific Chemical Mixing Zone Study Plan

Becky-

I have reviewed the GP Big Island Chemical Mixing Zone Study Report dated October 2007 and prepared by Olver, Inc. and have the following comments:

- Because of the differences in the effluent flow, river flow, number of discharge ports, etc. between the CORMIX runs and the instream study, there is really no way to precisely confirm the previous CORMIX results without running CORMIX under the conditions measured during the instream study. I do not have a current CORMIX license to be able to run that analysis but ideally it would have been provided by the consultant.
- There are numerous discrepancies between referenced 7Q10 flows that I haven't been able to sort out. The study report references a 7Q10 of 339 MGD for outfall 003 from the VPDES Fact Sheet. However, the Fact Sheet on file includes a 7Q10 of 559 MGD (p. 2) or 562 MGD (Attachment A) for outfall 003. The original CORMIX runs included a 7Q10 flow of only 295 MGD. Actual flows during the study were approximately 640 MGD.
- The depth of the instream maximum conductivity readings indicate that the effluent plume may not be as buoyant as was assumed in the CORMIX modeling, thus reducing mixing. This reduction in mixing may be partially counteracted by the increase in 7Q10 flow (from 295 MGD to approximately 560 MGD).

Despite the discrepancies between the CORMIX model runs and the stream survey, I believe that both indicate that all water quality criteria are met within a very short distance from the outfall and that we can continue to use the 11:1 (acute) and 21:1 (chronic) mixing ratios previously adopted. According to the study report, the only toxic parameter measured in the effluent at levels exceeding the WQC is Ammonia-N. The acute Ammonia-N criterion would require a dilution ratio of 1.37:1 to avoid an effluent limit. This amount of mixing is certainly provided within 1 meter of the diffuser. The report indicates that the chronic Ammonia-N criterion would require a dilution ratio of 10.9:1 to avoid an effluent limit. However, this is assuming a maximum effluent Ammonia-N concentration of 7.2 mg/l. Using the 97th% of 30-day averages of approximately 3.7 mg/l reduces the required mixing dilution ratio to 5.7:1. This dilution factor is certainly provided within the regulatory mixing zone of approximately 10 meters established by DEQ. Please note that dilution ratios of 11:1 (acute) and 21:1 (chronic) were apparently approved based on the original CORMIX runs. When using Mstranti.xls, these ratios should be entered as receiving stream flows of 10 (1Q10) and 20 (7Q10) rather than 11 and 21.

Feel free to give me a call with any questions or if you would like this put into a memo.

Allan

-----Original Message-----
From: France,Becky
Sent: Monday, September 15, 2008 9:34 AM
To: Brockenbrough,Allan
Subject: GA Pacific Chemical Mixing Zone Study Plan

I just wanted to follow up on the GP Big Island Chemical Mixing Zone Study Plan and see if you have any comments from running the CORMIX model. Do the model results correlate with the study results?

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List of Figures

OLVER INCORPORATED

1.0 INTRODUCTION

1.1 Background

The Georgia Pacific Corporation pulp and paper facility in Big Island, Virginia produces corrugated medium and liner board. Treated manufacturing wastewater is discharged into the James River via Outfall 003 in accordance with the provisions of VPDES Permit No. VA0003026. The permit issued to Georgia Pacific in 1994 included an impending ammonia limit based on the potential for this effluent to exceed the acute water quality standard in effect at that time.

To eliminate the need for the impending ammonia limit as well as to reduce the potential for future limits for other constituents, Georgia Pacific elected to replace the side-stream discharge structure with a submerged multi-port effluent diffuser. To determine optimal diffuser configuration, Olver Laboratories conducted an effluent mixing zone study that included effluent modeling to support the elimination of the ammonia limit. As part of this study, river velocity and river depth across the river in the vicinity of Outfall 003 were measured in October 1996 during typical seasonal low river flow conditions. The field and corresponding gauged river flow data were also used to calculate average river velocity values. This data was used with effluent flow and other site-specific information as input parameters for use with the Cornell Mixing Zone Expert System (CORMIX) model to determine optimal diffuser configuration (number of ports, discharge angle, discharge velocity, etc.).

The results of the mixing zone modeling were summarized in the November 14, 1997 report prepared by Olver Laboratories and submitted to the

Virginia Department of Environmental Quality (DEQ). In short, the modeling indicated that during 1Q10 conditions, the effluent comprised only 1 part in 19.5 parts of the mixed river water after 1.2 minutes at a distance of 9.9 meters from the diffuser. The model output indicated that the mixing results were unreliable for time intervals greater than 1.2 minutes. Under 7Q10 conditions, the model indicated that complete effluent mixing occurred at a distance of approximately 539 meters after 11.3 hours. This data was used to support the design and installation of the effluent diffuser that was installed in 1998 and currently in place at Outfall 003. The VPDES permit was modified to reflect the installation of the diffuser and the elimination of the impending ammonia limit.

The VPDES permit reissued in June 2000 included a requirement for the performance of a Chemical Mixing Zone Study to confirm the projections provided by the CORMIX modeling. Specifically, Part I.D.18 of the permit states:

> A mixing zone study shall be performed on effluent from outfall 003. The study must identify the spatial area of the James River that exceeds the numeric Water Quality Standards and shall be conducted when the river is less than twice the 7Q10 flow.

This plan was prepared to provide a summary of the methods, reporting, and schedule proposed to fulfill the permit requirement and is submitted to the Virginia DEQ for review and comment prior to the initiation of the program.

1.2 Objectives

The primary objectives of this study include:

1. The determination of Outfall 003 effluent mixing upon discharge to the James River during low flow conditions;

2. The determination of Outfall 003 effluent pollutants with the potential to exceed water quality standards using historical monitoring results; and,

3. The identification of the spatial area of the James River that exceeds the numeric water quality standards during periods of low river flow.

2.0 STUDY METHODS

2.1 Project Approach

The project will consist of three main components:

1. The determination of river and effluent mixing characteristics during river flows less than twice the established 7Q10 value.

2. The determination of those effluent parameters with the potential to exceed numeric water quality standards using recent historical effluent monitoring data.

3. The determination of the spatial area of the James River that exceeds the numeric acute and chronic water quality standards.

2.2 Study Site

The Georgia Pacific Big Island Mill is located in northeastern Bedford County near the Amherst County line. A map of this area is depicted in Figure 1. The James River at this point is a broad relatively deep river, designated as the Upper James River Basin, Section 11, Class II. A small dam and impoundment that serves as a source of water for hydroelectric power generation and cooling water for the mill bound the facility upstream. Approximately four miles downstream of the mill dam is the Coleman Falls Dam. Both dams are run-of-the-river facilities; as such, river flow is not regulated by either of the dams.

The mixing zone study site is the area adjacent to, and downstream of, Outfall 003. Outfall 003 is located approximately 1.25 miles downstream of the mill dam and approximately 2.9 miles upstream of the Coleman Falls Dam at a point immediately prior to the confluence of Long Branch with the James River. At this point, the river is approximately 98 meters (325 feet) in width, with and average depth of approximately 4.4 meters (14.6 feet).

2.3 Effluent Mixing Determination

2.3.1 River Flow Conditions

The effluent mixing determination will be performed when river flows are less than twice the 7Q10 established for this discharge. The 7Q10 for Outfall 003 as established in the VPDES permit Program Fact Sheet for the June 2000 permit is 283.9 MGD or 439.3 CFS. As such, the field component of this study will be performed when river flows are less than twice the 7Q10, or less than 878.6 CFS. River flows will be monitored using the United States Geologic Survey (USGS) Holcomb Rock Gage Station (02025500) which will be accessed using the Internet.

2.3.2 Effluent Mixing Determination

The effluent discharged at Outfall 003 is characterized by elevated specific conductance, typically in the vicinity of 1,500 *u*mhos/cm. Background river levels are expected to be approximately 200 *u*mhos/cm. As such, effluent mixing will be determined by measuring conductivity in the river at selected points upstream and downstream of the Outfall 003 diffuser. The conductivity and temperature of the effluent will be measured prior to the initiation of the river monitoring and at several times throughout the performance of the field work. These are not expected to change substantially over the course of the monitoring period since the wastewater discharged from 003 is contained in a very large (approximately 20 acre) sedimentation basin/stabilization pond. Background river conductivity and temperature will be measured at several locations along a transect located approximately 25 meters upstream of the diffuser and the beyond the influence of the Outfall 003 wastewater.

The effluent mixing patterns in the river will be determined by measuring conductivity in areas downstream of the diffuser. Transects will be located at distances of approximately 10 meters, 50 meters, 100 meters, 250 meters, and 500 meters. The 10-meter distance represents the distance for substantial mixing during 1Q10 conditions based on the earlier CORMIX modeling, while the 500 meters represents the projected area for complete mix during 7Q10 conditions. It is anticipated that there will not be a potential for an exceedence of water quality standards beyond this point. The remaining distances were selected to better define the spatial areas of any water quality standards exceedence.

Conductivity measurements will be made at 5-meter intervals along each transect starting from the right (discharge side) bank. These will continue toward the far (left) bank until the conductivity readings approach or reach the previously established background levels. Measurements will be made at the surface (6 inches) and at depth intervals of 3-5 feet. The transect distances, width intervals, and depth intervals may be adjusted to better define the effluent mixing based on the conditions encountered in the field.

All conductivity measurements will be made using a YSI Model 30 SCT meter with a 25 foot cable and probe. This meter will be calibrated prior to use in accordance with method requirements. Distances from the diffuser and bank will be measured using a Bushnell Yardage Pro 500 distance meter.

2.3.3 Effluent Mixing Data Analysis

The river conductivity data for the downstream transects will be used to determine the ratio of effluent and river water at each of the sampling locations. This calculation will be performed using the effluent conductivity data and the upstream background data. The corresponding dilution factor for each sampling location will be used in conjunction with the effluent water quality standards data to determine the spatial area of any instream water quality standards exceedence.

2.4 Water Quality Standards Evaluation

2.4.1 Effluent Characteristics

The chemical characteristics of Outfall 003 were determined previously in conjunction with recent water quality standards monitoring required by the VPDES permit as well as for VPDES permit reissuance applications. The data developed for Outfall 003 will be used to identify those pollutants with the potential to exceed instream water quality standards. The data for those pollutants measured at concentrations above their respective detection/quantification limits will be compared to the acute and chronic waste load allocation values for this discharge. Those parameters that exceed 40 percent of their respective acute waste load allocations or 60 percent of their respective chronic waste load allocations will be examined further to determine the spatial area for an exceedence, if any, of instream water quality standards.

2.4.2 Determination of Spatial Areas

The spatial area of acute and chronic water quality standards exceedence will be determined for those parameters identified in Section 2.4.1. The highest measured concentration for each target parameter will be used in conjunction with the dilution factors established for each monitoring location to calculate a projected instream concentration. The projected concentration values will be compared to the respective acute and chronic water quality standards to identify any areas of exceedence. The spatial area(s) will then be calculated for each parameter.

3.0 REPORTING

Within approximately 120 days of completion of the field activities, a final narrative report that presents the results of the study will be submitted to the Virginia Department of Environmental Quality. The final report will present the following:

1. A summary of the methodology used, including any deviations from the approved study plan.
2. The effluent and river mixing data for locations upstream and downstream of the effluent diffuser.
3. A summary of the water quality standards evaluations for those parameters with the potential to exceed the numeric acute and chronic water quality standards.
4. The spatial area of the James River that exceeds the numeric acute and chronic water quality standards.

4.0 SCHEDULE

In accordance with permit requirements, the field component of this study will be performed during river flows that are less than two times the 7Q10 established for this site. It is anticipated that this will be performed in the October-November 2002 time frame, provided that river flows remain at or near the current levels. Upon completion of the field component of the study, the evaluation of water quality standards will be examined and the spatial area of the James River that exceeds the numeric water quality standards will be determined. The final report will be prepared and submitted to the Virginia DEQ upon completion of the spatial determinations. It is anticipated that the report will be submitted to DEQ within 120 days of completing the field studies.

File

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

West Central Regional Office
3019 Peters Creek Road, Roanoke, Virginia 24019
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www.deq.state.va.us

Robert G. Burnley
Director

Steven A. Dietrich
Regional Director

November 5, 2002

Mr. J. Patrick Moore
Georgia-Pacific Corporation
PO Box 40
Big Island, VA 24526

RE: VPDES Permit No. VA0003026
Permit Part I.D.18; Received October 21, 2002; Conditional Acceptance of Chemical Mixing Zone Study Plan; Georgia-Pacific Corporation

Dear Mr. Moore:

This office has received and reviewed the above referenced Chemical Mixing Zone Study Plan. The Plan describes procedures to evaluate the effluent mixing zone for outfall 003 and define the spatial area of the James River that exceeds the acute and chronic water quality criteria. The study is to be conducted when the River is less than twice the 7Q10 flow. This plan proposes to use conductivity taken at five transects to determine dilution factors which can be used to calculate any areas of water quality exceedances. A few modifications to the sampling protocol are discussed below.

The diffuser will discharge 15 separate plumes. At the 10-meter transect, one sample every 5 meters will not ensure that the concentration measured is in one of the plumes. Conductivity should be monitored continuously as the river is crossed with the high and low readings recorded as each plume is crossed. Continuous conductivity measurements should also be taken at a 25 meter transect which is approximately the length of the current mixing zone.

At each sampling location, at least two vertical profiles should be performed and a transect completed at the depth with the highest conductivity.

The plan does not indicate how the boat will be propelled. The river appears to be deep and slow moving in this section. Steps need to be taken to eliminate any disturbance of the water column near the conductivity meter, especially anywhere the plume approaches the surface.

Conductivity in the Georgia Pacific effluent (about 1500 umhos/cm) is reportedly about 7.5 times that in the river (about 200 umhos/cm). This relatively small gradient may disappear within a very short distance of the outfall. If the conductivity measurements do not provide useful results, the study needs to be repeated using dye.

The mixing zone study data will be used to confirm the results predicted by the CORMIX mixing zone model. The mixing zone data will be used by DEQ in future permitting decisions regarding water quality criteria evaluations. Should you have any questions, please contact Becky L. France at (540) 562-6793 or blfrance@deq.state.va.us.

Sincerely,

Steven A. Dietrich

Steven A. Dietrich, P.E.
Regional Director

cc: R. Lawrence Hoffman, Olver Incorporated

COMMONWEALTH of VIRGINIA

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L. Preston Bryant, Jr.
Secretary of Natural Resources

David K. Paylor
Director

Steven A. Dietrich
Regional Director

October 2, 2008

Mr. Tim Pierce
GP Big Island LLC
PO Box 40
Big Island, VA 24526

RE: VPDES Permit No. VA0003026; GP Big Island LLC; Required by Part I.D.13; Received October 15, 2007; Acceptance of Chemical Mixing Zone Report

Dear Mr. Pierce:

The above referenced Chemical Mixing Zone Report was received in this office on October 15, 2007. This report has been reviewed by regional permitting staff and Central office staff. The submittals appear to satisfy Section I.D.13 of VPDES Permit VA0003026. Acceptance of the above reports does not relieve the permittee (owner) of the responsibility of maintaining and operating the facility in a manner that is consistent with sound operational and maintenance principles and practices.

In accordance with the permit, the study was conducted in August of 2006 during a period when the receiving stream averaged less than twice the 7Q10. The river flows during the field study were greater than those used in the CORMIX modeling. Conductivity and temperature were measured along transacts from 10 to 500 meters below the outfall. Rapid mixing occurred within the first 10 meters. The report concluded that for ammonia the calculated dilution factors showed that the acute and chronic water quality criteria were attained along the 10 meter transect downstream of the diffuser. Refer to the enclosed memorandums for staff review comments. Should you have any questions, please contact Becky L. France at (540) 562-6793.

Sincerely,

Robert J. Weld
Deputy Regional Director

Enclosures: Chemical Mixing Zone Study Report review memorandums

M E M O R A N D U M

DEPARTMENT OF ENVIRONMENTAL QUALITY
West Central Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: GP Big Island LLC (VA00030206) Chemical Mixing Zone Study Report

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior BLF

DATE: November 1, 2007

I have enclosed a copy of the Chemical Mixing Zone Study Report for GP Big Island. This report was required by a special condition in their VPDES permit. This condition requires that a mixing zone study be performed on outfall 003 to identify the spatial area of the James River that exceeds the numeric Water Quality Standards. This study is to be conducted when the receiving stream is less than twice the 7Q10 flow. The purpose of the study is to determine whether the size of the mixing zone predictions given in CORMIX model are conservative enough be protective of Water Quality Standard Regulations.

The process effluent for the facility is discharged into the James River via a submerged 17 port diffuser. The study was conducted in August 2006 during a period of time when the receiving stream averaged 640 MGD which was less than twice the 7Q10 flow. The effluent flow during the study averaged 6.85 MGD which was less than the 7.14 MGD flow used in a CORMIX model. Conductivity and temperature were measured along transacts located at 10, 25, 50, 100, and 500 meters below the outfall. These measurements were used to define the mixing zone.

Tables 3 (page 22) in the report describes field and CORMIX model conditions and Table 4 (page.23) compares the dilution factors calculated in the field with the CORMIX model dilution factor calculations. The dilution factor calculations were based upon an average stream flow of 640 MGD. As we discussed, please provide your insights as to whether the CORMIX model predictions would be consistent with the study results when the stream flow was 640 MGD and effluent flow was 6.85 MGD.

Georgia-Pacific
VA0003026

Water Quality Standards Data Above Quantification Level (Outfall 003)

Parameter	(ug/L) 10/26/03
chloride	66000
Dissolved Sb	1.6
Dissolved As	1.4
Total Cr	2.3
Dissolved Cu	2.8
Dissolved Ni	4.1
Dissolved Zn	5.8
Dissolved Pb	0.6
bis (2-ethyl hexyl) phthalate	46.5

Date	Ammonia (mg/L)
10/20/2003	0.9
12/17/2003	2.4
1/5/2004	3.3
1/13/2004	3.1
1/28/2004	2.5
2/17/2004	2.5
3/16/2004	0.1
4/19/2004	2.0
5/24/2004	4.6
6/21/2004	4.9
7/19/2004	2.4
8/30/2004	1.3
9/13/2004	1.2
11/1/2004	1.9

Attachment J

Wasteload and Limit Calculations

- **Storm Water Criteria Spreadsheet**
- **Summary of Effluent and Stream Data for Wasteload Allocation**

<u>Outfall 001</u>

- **Antidegradation Wasteload Allocation Spreadsheet**

<u>Outfall 002</u>

- **Antidegradation Wasteload Allocation Spreadsheet**

<u>Outfall 003</u>

- **Antidegradation Wasteload Allocation Spreadsheet**
- **STATS Program Output (ammonia)**
- **Federal Effluent Guidelines Excerpt (40 CFR Part 430 – Subparts F & J)**

GP Big Island
VA0003026

Summary of Effluent and Stream Data used to Determine Wasteload Allocations

	Outfall 002 (River Mile 278.77)			
	stream data	source	effluent data	source
temperature °C	28	raw water intake	36	effluent data
temperature (January -May) °C	25	raw water intake	30	effluent data
pH 90th percentile S.U.	8.6	raw water intake	8.5	effluent data
pH 10th percentile S.U.	7.1	raw water intake	7.0	effluent data
hardness mean mg/L	104	upstream STORET station	96	effluent toxicity test data

Outfall 002		stream	effluent data
pH 90th percentile S.U.	log concentration	2.512E-09	3.162E-09
pH 10th percentile S.U.	log concentration	7.943E-08	1.000E-07

	Outfall 003 (River Mile 277.57)			
	stream data	source	effluent data	source
temperature °C	31.6	calculated instream concentration*	30	effluent data
temperature °C (January - May)	30.3	calculated instream concentration*	26	effluent data
pH 90th percentile S.U.	8.5	calculated instream concentration*	8.4	effluent data
pH 10th percentile S.U.	7.0	calculated instream concentration*	7.2	effluent data
hardness mean mg/L	99.4	calculated instream concentration*	170	effluent toxicity test data

calculated instream 90th percentile S.U.	log concentration	2.94E-09
calculated instream 10th percentile S.U.	log concentration	9.23E-08

Notes:
Permittee monitors pH and temperature at the raw water intake which is above outfalls 002 and 003.
2-JMS282.28 - upstream STORET station above all GP outfalls

*Instream concentration prior to outfall 003 calculated from mix between raw water intake and outfall 001 and 002 values. Instream concentration and 0.81 percent of 1Q10 stream flow predicted from MIX program mixed with effluent concentration and 30 day max flow. The concentration just below outfall 002 is derived from this calculation. This value is a conservative estimation of the concentration upstream of outfall 003 and does not take into account additional stream flow from tributaries/drainage between outfall 002 and outfall 003.

Calculated Instream Concentration=(Qs*Cs+Qe*Ce)/(Qs+Qe)

Qe = 30 day max flow (outfall 002)	3.65 MGD
Qe = 30 day max flow (outfall 001)	0.12 MGD
Ce= outfall 002 effluent concentration	
Qs = 0.81 percent of 1Q10 stream flow above outfall 002 =	2.51 MGD
Cs=instream concentration	

percent of 1Q10 for above from outfall 002 MIX calculation 0.81
7Q10 flow above outfall 002 310 MGD

Summary of Effluent and Stream Data used to Determine Wasteload Allocations

GP Big Island
VA0003026

	Outfall 001 (River Mile 278.81)			
	stream data	source	effluent data	source
temperature °C	28	raw water intake	34	effluent data
temperature °C (Jan. - May)	25	raw water intake	27	effluent data
pH 90th percentile S.U.	8.6	raw water intake	8.3	effluent data
pH 10th percentile S.U.	7.1	raw water intake	6.9	effluent data
hardness mean mg/L	104	upstream STORET station	154	effluent toxicity test data

Outfall 001		stream	effluent data
pH 90th percentile S.U.	log concentration	2.512E-09	5.012E-09
pH 10th percentile S.U.	log concentration	7.943E-08	1.259E-07

Downstream STORET Data 2-JMS275.75 - use for storm water allocations only		
pH 90th percentile		8.4 S.U.
pH 10th percentile		7.3 S.U.
Temperature 90th percentile		25.9 °C
Temperature 90th percentile	(Jan-May)	16.9 °C
Mean Hardness		101 mg/L

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: GP Big Island (storm water outfalls acute WLAs only) Permit No.: VA0003026

Receiving Stream: James River

Version: OWP Guidance Memo 00-2011 (8/24/00)

downstream STORET data

Stream Information	
Mean Hardness (as CaCO3) =	101 mg/L
90% Temperature (Annual) =	25.9 deg C
90% Temperature (Wet season) =	16.9 deg C
90% Maximum pH =	8.4 SU
10% Maximum pH =	7.3 SU
Tier Designation (1 or 2) =	2
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows	
1Q10 (Annual) =	1 MGD
7Q10 (Annual) =	1 MGD
30Q10 (Annual) =	1 MGD
1Q10 (Wet season) =	1 MGD
30Q10 (Wet season)	1 MGD
30Q5 =	1 MGD
Harmonic Mean =	1 MGD

Mixing Information	
Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

downstream STORET data

Effluent Information	
Mean Hardness (as CaCO3) =	101 mg/L
90% Temp (Annual) =	25.9 deg C
90% Temp (Wet season) =	16.9 deg C
90% Maximum pH =	8.4 SU
10% Maximum pH =	7.3 SU
Discharge Flow =	1 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	2.0E+03	--	--	na	9.9E+01	--	--	na	2.0E+02	--	--	na	**2.0E+02**
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.9E+01	--	--	na	9.3E-01	--	--	na	1.9E+00	--	--	na	**1.9E+00**
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	5.0E+00	--	--	na	2.5E-01	--	--	na	5.0E-01	--	--	na	**5.0E-01**
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	6.0E+00	--	na	1.0E-03	7.5E-01	--	na	5.0E-05	1.5E+00	--	na	1.0E-04	**1.5E+00**	--	na	**1.0E-04**
Ammonia-N (mg/l) (Yearly)	0	3.88E+00	6.19E-01	na	--	7.8E+00	1.2E+00	na	--	9.71E-01	1.55E-01	na	--	1.9E+00	3.1E-01	na	--	**1.9E+00**	**3.1E-01**	na	--
Ammonia-N (mg/l) (High Flow)	0	3.88E+00	1.11E+00	na	--	7.8E+00	2.2E+00	na	--	9.71E-01	2.77E-01	na	--	1.9E+00	5.5E-01	na	--	**1.9E+00**	**5.5E-01**	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	8.0E+04	--	--	na	4.0E+03	--	--	na	8.0E+03	--	--	na	**8.0E+03**
Antimony	0	--	--	na	6.4E+02	--	--	na	1.3E+03	--	--	na	6.4E+01	--	--	na	1.3E+02	--	--	na	**1.3E+02**
Arsenic	0	3.4E+02	1.5E+02	na	--	6.8E+02	3.0E+02	na	--	8.5E+01	3.8E+01	na	--	1.7E+02	7.5E+01	na	--	**1.7E+02**	**7.5E+01**	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	1.0E+03	--	--	na	5.1E+01	--	--	na	1.0E+02	--	--	na	**1.0E+02**
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	4.0E-03	--	--	na	2.0E-04	--	--	na	4.0E-04	--	--	na	**4.0E-04**
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	na	**3.6E-02**
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	na	**3.6E-02**
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	na	**3.6E-02**
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	na	**3.6E-02**
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	1.1E+01	--	--	na	5.3E-01	--	--	na	1.1E+00	--	--	na	**1.1E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.3E+05	--	--	na	6.5E+03	--	--	na	1.3E+04	--	--	na	**1.3E+04**
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	4.4E+01	--	--	na	2.2E+00	--	--	na	4.4E+00	--	--	na	**4.4E+00**
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	2.8E+03	--	--	na	1.4E+02	--	--	na	2.8E+02	--	--	na	**2.8E+02**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.8E+03	--	--	na	1.9E+02	--	--	na	3.8E+02	--	--	na	**3.8E+02**
Cadmium	0	4.0E+00	1.1E+00	na	--	7.9E+00	2.3E+00	na	--	9.9E-01	2.9E-01	na	--	2.0E+00	5.7E-01	na	--	**2.0E+00**	**5.7E-01**	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	3.2E+01	--	--	na	1.6E+00	--	--	na	3.2E+00	--	--	na	**3.2E+00**
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	4.8E+00	8.6E-03	na	1.6E-02	6.0E-01	1.1E-03	na	8.1E-04	1.2E+00	2.2E-03	na	1.6E-03	**1.2E+00**	**2.2E-03**	na	**1.6E-03**
Chloride	0	8.6E+05	2.3E+05	na	--	1.7E+06	4.6E+05	na	--	2.2E+05	5.8E+04	na	--	4.3E+05	1.2E+05	na	--	**4.3E+05**	**1.2E+05**	na	--
TRC	0	1.9E+01	1.1E+01	na	--	3.8E+01	2.2E+01	na	--	4.8E+00	2.8E+00	na	--	9.5E+00	5.5E+00	na	--	**9.5E+00**	**5.5E+00**	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	3.2E+03	--	--	na	1.6E+02	--	--	na	3.2E+02	--	--	na	**3.2E+02**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	2.6E+02	--	--	na	1.3E+01	--	--	na	2.6E+01	--	--	na	2.6E+01
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.2E+04	--	--	na	1.1E+03	--	--	na	2.2E+03	--	--	na	2.2E+03
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	3.2E+03	--	--	na	1.6E+02	--	--	na	3.2E+02	--	--	na	3.2E+02
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	3.0E+02	--	--	na	1.5E+01	--	--	na	3.0E+01	--	--	na	3.0E+01
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.7E-01	8.2E-02	na	--	2.1E-02	1.0E-02	na	--	4.2E-02	2.1E-02	na	--	4.2E-02	2.1E-02	na	--
Chromium III	0	5.7E+02	7.5E+01	na	--	1.1E+03	1.5E+02	na	--	1.4E+02	1.9E+01	na	--	2.9E+02	3.7E+01	na	--	2.9E+02	3.7E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	3.2E+01	2.2E+01	na	--	4.0E+00	2.8E+00	na	--	8.0E+00	5.5E+00	na	--	8.0E+00	5.5E+00	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	2.0E+01	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	na	1.8E-03	--	--	na	3.6E-03	--	--	na	3.6E-03
Copper	0	1.4E+01	9.0E+00	na	--	2.7E+01	1.8E+01	na	--	3.4E+00	2.3E+00	na	--	6.8E+00	4.5E+00	na	--	6.8E+00	4.5E+00	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	4.4E+01	1.0E+01	na	3.2E+04	5.5E+00	1.3E+00	na	1.6E+03	1.1E+01	2.6E+00	na	3.2E+03	1.1E+01	2.6E+00	na	3.2E+03
DDD[C]	0	--	--	na	3.1E-03	--	--	na	6.2E-03	--	--	na	3.1E-04	--	--	na	6.2E-04	--	--	na	6.2E-04
DDE[C]	0	--	--	na	2.2E-03	--	--	na	4.4E-03	--	--	na	2.2E-04	--	--	na	4.4E-04	--	--	na	4.4E-04
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	2.2E+00	2.0E-03	na	4.4E-03	2.8E-01	2.5E-04	na	2.2E-04	5.5E-01	5.0E-04	na	4.4E-04	5.5E-01	5.0E-04	na	4.4E-04
Demeton	0	--	1.0E-01	na	--	--	2.0E-01	na	--	--	2.5E-02	na	--	--	5.0E-02	na	--	--	5.0E-02	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	3.4E-01	3.4E-01	na	--	4.3E-02	4.3E-02	na	--	8.5E-02	8.5E-02	na	--	8.5E-02	8.5E-02	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	na	3.6E-02
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.6E+03	--	--	na	1.3E+02	--	--	na	2.6E+02	--	--	na	2.6E+02
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.9E+03	--	--	na	9.6E+01	--	--	na	1.9E+02	--	--	na	1.9E+02
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.8E+02	--	--	na	1.9E+01	--	--	na	3.8E+01	--	--	na	3.8E+01
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	5.6E-01	--	--	na	2.8E-02	--	--	na	5.6E-02	--	--	na	5.6E-02
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	3.4E+02	--	--	na	1.7E+01	--	--	na	3.4E+01	--	--	na	3.4E+01
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	7.4E+02	--	--	na	3.7E+01	--	--	na	7.4E+01	--	--	na	7.4E+01
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.4E+04	--	--	na	7.1E+02	--	--	na	1.4E+03	--	--	na	1.4E+03
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	2.0E+04	--	--	na	1.0E+03	--	--	na	2.0E+03	--	--	na	2.0E+03
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.8E+02	--	--	na	2.9E+01	--	--	na	5.8E+01	--	--	na	5.8E+01
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	3.0E+02	--	--	na	1.5E+01	--	--	na	3.0E+01	--	--	na	3.0E+01
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	4.2E+02	--	--	na	2.1E+01	--	--	na	4.2E+01	--	--	na	4.2E+01
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	4.8E-01	1.1E-01	na	1.1E-03	6.0E-02	1.4E-02	na	5.4E-05	1.2E-01	2.8E-02	na	1.1E-04	1.2E-01	2.8E-02	na	1.1E-04
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	8.8E+04	--	--	na	4.4E+03	--	--	na	8.8E+03	--	--	na	8.8E+03
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.7E+03	--	--	na	8.5E+01	--	--	na	1.7E+02	--	--	na	1.7E+02
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.2E+06	--	--	na	1.1E+05	--	--	na	2.2E+05	--	--	na	2.2E+05
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	9.0E+03	--	--	na	4.5E+02	--	--	na	9.0E+02	--	--	na	9.0E+02
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.1E+04	--	--	na	5.3E+02	--	--	na	1.1E+03	--	--	na	1.1E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	5.6E+02	--	--	na	2.8E+01	--	--	na	5.6E+01	--	--	na	5.6E+01
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	6.8E+01	--	--	na	3.4E+00	--	--	na	6.8E+00	--	--	na	6.8E+00
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	1.0E-07	--	--	na	5.1E-09	--	--	na	1.0E-08	--	--	na	1.0E-08
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	4.0E+00	--	--	na	2.0E-01	--	--	na	4.0E-01	--	--	na	4.0E-01
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	4.4E-01	1.1E-01	na	1.8E+02	5.5E-02	1.4E-02	na	8.9E+00	1.1E-01	2.8E-02	na	1.8E+01	1.1E-01	2.8E-02	na	1.8E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	4.4E-01	1.1E-01	na	1.8E+02	5.5E-02	1.4E-02	na	8.9E+00	1.1E-01	2.8E-02	na	1.8E+01	1.1E-01	2.8E-02	na	1.8E+01
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	4.4E-01	1.1E-01	--	--	5.5E-02	1.4E-02	--	--	1.1E-01	2.8E-02	--	--	1.1E-01	2.8E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.8E+02	--	--	na	8.9E+00	--	--	na	1.8E+01	--	--	na	1.8E+01
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.7E-01	7.2E-02	na	1.2E-01	2.2E-02	9.0E-03	na	6.0E-03	4.3E-02	1.8E-02	na	1.2E-02	4.3E-02	1.8E-02	na	1.2E-02
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	6.0E-01	--	--	na	3.0E-02	--	--	na	6.0E-02	--	--	na	6.0E-02

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	4.2E+03	--	--	na	2.1E+02	--	--	na	4.2E+02	--	--	na	4.2E+02
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.8E+02	--	--	na	1.4E+01	--	--	na	2.8E+01	--	--	na	2.8E+01
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.1E+04	--	--	na	5.3E+02	--	--	na	1.1E+03	--	--	na	1.1E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	2.0E-02	na	--	--	2.5E-03	na	--	--	5.0E-03	na	--	--	5.0E-03	na	--
Heptachlor[C]	0	5.2E-01	3.8E-03	na	7.9E-04	1.0E+00	7.6E-03	na	1.6E-03	1.3E-01	9.5E-04	na	7.9E-05	2.6E-01	1.9E-03	na	1.6E-04	2.6E-01	1.9E-03	na	1.6E-04
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	1.0E+00	7.6E-03	na	7.8E-04	1.3E-01	9.5E-04	na	3.9E-05	2.6E-01	1.9E-03	na	7.8E-05	2.6E-01	1.9E-03	na	7.8E-05
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	5.8E-03	--	--	na	2.9E-04	--	--	na	5.8E-04	--	--	na	5.8E-04
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	3.6E+02	--	--	na	1.8E+01	--	--	na	3.6E+01	--	--	na	3.6E+01
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	9.8E-02	--	--	na	4.9E-03	--	--	na	9.8E-03	--	--	na	9.8E-03
Hexachlorocyclohexane Beta BHC[C]	0	--	--	na	1.7E-01	--	--	na	3.4E-01	--	--	na	1.7E-02	--	--	na	3.4E-02	--	--	na	3.4E-02
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.9E+00	--	na	3.6E+00	2.4E-01	--	na	1.8E-01	4.8E-01	--	na	3.6E-01	4.8E-01	--	na	3.6E-01
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.2E+03	--	--	na	1.1E+02	--	--	na	2.2E+02	--	--	na	2.2E+02
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	6.6E+01	--	--	na	3.3E+00	--	--	na	6.6E+00	--	--	na	6.6E+00
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	4.0E+00	na	--	--	5.0E-01	na	--	--	1.0E+00	na	--	--	1.0E+00	na	--
Indeno (1,2,3-cd) pyrene[C]	0	--	--	na	1.8E-01	--	--	na	3.6E-01	--	--	na	1.8E-02	--	--	na	3.6E-02	--	--	na	3.6E-02
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	1.9E+04	--	--	na	9.6E+02	--	--	na	1.9E+03	--	--	na	1.9E+03
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Lead	0	1.2E+02	1.4E+01	na	--	2.4E+02	2.7E+01	na	--	3.0E+01	3.4E+00	na	--	6.0E+01	6.8E+00	na	--	6.0E+01	6.8E+00	na	--
Malathion	0	--	1.0E-01	na	--	--	2.0E-01	na	--	--	2.5E-02	na	--	--	5.0E-02	na	--	--	5.0E-02	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	2.8E+00	1.5E+00	--	--	3.5E-01	1.9E-01	--	--	7.0E-01	3.9E-01	--	--	7.0E-01	3.9E-01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	3.0E+03	--	--	na	1.5E+02	--	--	na	3.0E+02	--	--	na	3.0E+02
Methylene Chloride[C]	0	--	--	na	5.9E+03	--	--	na	1.2E+04	--	--	na	5.9E+02	--	--	na	1.2E+03	--	--	na	1.2E+03
Methoxychlor	0	--	3.0E-02	na	--	--	6.0E-02	na	--	--	7.5E-03	na	--	--	1.5E-02	na	--	--	1.5E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Nickel	0	1.8E+02	2.0E+01	na	4.6E+03	3.7E+02	4.1E+01	na	9.2E+03	4.6E+01	5.1E+00	na	4.6E+02	9.2E+01	1.0E+01	na	9.2E+02	9.2E+01	1.0E+01	na	9.2E+02
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.4E+03	--	--	na	6.9E+01	--	--	na	1.4E+02	--	--	na	1.4E+02
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	6.0E+01	--	--	na	3.0E+00	--	--	na	6.0E+00	--	--	na	6.0E+00
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	1.2E+02	--	--	na	6.0E+00	--	--	na	1.2E+01	--	--	na	1.2E+01
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	1.0E+01	--	--	na	5.1E-01	--	--	na	1.0E+00	--	--	na	1.0E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	5.6E+01	1.3E+01	na	--	7.0E+00	1.7E+00	--	--	1.4E+01	3.3E+00	--	--	1.4E+01	3.3E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	1.3E-01	2.6E-02	na	--	1.6E-02	3.3E-03	na	--	3.3E-02	6.5E-03	na	--	3.3E-02	6.5E-03	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	2.8E-02	na	1.3E-03	--	3.5E-03	na	6.4E-05	--	7.0E-03	na	1.3E-04	--	7.0E-03	na	1.3E-04
Pentachlorophenol[C]	0	1.2E+01	9.0E+00	na	3.0E+01	2.4E+01	1.8E+01	na	6.0E+01	2.9E+00	2.3E+00	na	3.0E+00	5.9E+00	4.5E+00	na	6.0E+00	5.9E+00	4.5E+00	na	6.0E+00
Phenol	0	--	--	na	8.6E+05	--	--	na	1.7E+06	--	--	na	8.6E+04	--	--	na	1.7E+05	--	--	na	1.7E+05
Pyrene	0	--	--	na	4.0E+03	--	--	na	8.0E+03	--	--	na	4.0E+02	--	--	na	8.0E+02	--	--	na	8.0E+02
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	8.0E+00	--	--	na	4.0E-01	--	--	na	8.0E-01	--	--	na	8.0E-01
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	4.0E+01	1.0E+01	na	8.4E+03
Silver	0	3.5E+00	--	na	--	7.0E+00	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	8.0E+01
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	6.6E+01
Thallium	0	--	--	na	4.7E-01	--	--	na	9.4E-01
Toluene	0	--	--	na	6.0E+03	--	--	na	1.2E+04
Total dissolved solids	0	--	--	na	--	--	--	na	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	1.5E+00	4.0E-04	na	5.6E-03
Tributyltin	0	4.6E-01	7.2E-02	na	--	9.2E-01	1.4E-01	na	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.4E+02
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	3.2E+02
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	6.0E+02
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	4.8E+01
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	4.8E+01
Zinc	0	1.2E+02	1.2E+02	na	2.6E+04	2.4E+02	2.4E+02	na	5.2E+04

Parameter (ug/l unless noted)	Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	5.0E+00	1.3E+00	na	4.2E+02	1.0E+01	2.5E+00	na	8.4E+02	**1.0E+01**	**2.5E+00**	**na**	**8.4E+02**
Silver	8.8E-01	--	na	--	1.8E+00	--	na	--	**1.8E+00**	**--**	**na**	**--**
Sulfate	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	--	--	na	4.0E+00	--	--	na	8.0E+00	**--**	**--**	**na**	**8.0E+00**
Tetrachloroethylene[C]	--	--	na	3.3E+00	--	--	na	6.6E+00	**--**	**--**	**na**	**6.6E+00**
Thallium	--	--	na	4.7E-02	--	--	na	9.4E-02	**--**	**--**	**na**	**9.4E-02**
Toluene	--	--	na	6.0E+02	--	--	na	1.2E+03	**--**	**--**	**na**	**1.2E+03**
Total dissolved solids	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene [C]	1.8E-01	5.0E-05	na	2.8E-04	3.7E-01	1.0E-04	na	5.6E-04	**3.7E-01**	**1.0E-04**	**na**	**5.6E-04**
Tributyltin	1.2E-01	1.8E-02	na	--	2.3E-01	3.6E-02	na	--	**2.3E-01**	**3.6E-02**	**na**	**--**
1,2,4-Trichlorobenzene	--	--	na	7.0E+00	--	--	na	1.4E+01	**--**	**--**	**na**	**1.4E+01**
1,1,2-Trichloroethane[C]	--	--	na	1.6E+01	--	--	na	3.2E+01	**--**	**--**	**na**	**3.2E+01**
Trichloroethylene [C]	--	--	na	3.0E+01	--	--	na	6.0E+01	**--**	**--**	**na**	**6.0E+01**
2,4,6-Trichlorophenol [C]	--	--	na	2.4E+00	--	--	na	4.8E+00	**--**	**--**	**na**	**4.8E+00**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	--	--	na	2.4E+00	--	--	na	4.8E+00	**--**	**--**	**na**	**4.8E+00**
Zinc	3.0E+01	3.0E+01	na	2.6E+03	5.9E+01	6.0E+01	na	5.2E+03	**5.9E+01**	**6.0E+01**	**na**	**5.2E+03**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.3E+02
Arsenic	4.5E+01
Barium	na
Cadmium	3.4E-01
Chromium III	2.2E+01
Chromium VI	3.2E+00
Copper	2.7E+00
Iron	na
Lead	4.1E+00
Manganese	na
Mercury	2.3E-01
Nickel	6.1E+00
Selenium	1.5E+00
Silver	7.0E-01
Zinc	2.4E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

1.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 1.000

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	1.000	1.000	2.000	2.000
7Q10	1.000	N/A	2.000	N/A
30Q10	1.000	1.000	2.000	2.000
30Q5	1.000	N/A	2.000	N/A
Harm. Mean	1.000	N/A	2.000	N/A
Annual Avg.	0.000	N/A	1.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	25.900	16.900
30Q10 90th% Temp. Mix (deg C)	25.900	16.900
1Q10 90th% pH Mix (SU)	8.400	8.400
30Q10 90th% pH Mix (SU)	8.400	8.400
1Q10 10th% pH Mix (SU)	7.300	N/A
7Q10 10th% pH Mix (SU)	7.300	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	101.0	101.0
7Q10 Hardness (mg/L as CaCO3)	101.0	101.0

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.400
(7.204 - pH)	-1.196
(pH - 7.204)	1.196
Trout Present Criterion (mg N/l	2.593
Trout Absent Criterion (mg N/L	3.883
Trout Present?	n
Effective Criterion (mg N/L)	3.883

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	25.900
90th Percentile pH (SU)	8.400
MIN	1.368
MAX	25.900
(7.688 - pH)	-0.712
(pH - 7.688)	0.712
Early LS Present Criterion (mg N	0.619
Early LS Absent Criterion (mg N/	0.619
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.619

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.400
(7.204 - pH)	-1.196
(pH - 7.204)	1.196
Trout Present Criterion (mg N/l	2.593
Trout Absent Criterion (mg N/L	3.883
Trout Present?	n
Effective Criterion (mg N/L)	3.883

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	16.900
90th Percentile pH (SU)	8.400
MIN	2.444
MAX	16.900
(7.688 - pH)	-0.712
(pH - 7.688)	0.712
Early LS Present Criterion (mg N	1.106
Early LS Absent Criterion (mg N/	1.106
Early Life Stages Present?	y
Effective Criterion (mg N/L)	1.106

1.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 1.000

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	1.000	1.000	2.000	2.000
7Q10	1.000	N/A	2.000	N/A
30Q10	1.000	1.000	2.000	2.000
30Q5	1.000	N/A	2.000	N/A
Harm. Mean	1.000	N/A	2.000	N/A
Annual Avg.	0.000	N/A	1.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	25.900	16.900
30Q10 90th% Temp. Mix (deg C)	25.900	16.900
1Q10 90th% pH Mix (SU)	8.400	8.400
30Q10 90th% pH Mix (SU)	8.400	8.400
1Q10 10th% pH Mix (SU)	7.300	N/A
7Q10 10th% pH Mix (SU)	7.300	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	101.000	101.000
7Q10 Hardness (mg/L as CaCO3) =	101.000	101.000

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.400
(7.204 - pH)	-1.196
(pH - 7.204)	1.196
Trout Present Criterion (mg N/l	2.593
Trout Absent Criterion (mg N/L	3.883
Trout Present?	n
Effective Criterion (mg N/L)	3.883

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	25.900
90th Percentile pH (SU)	8.400
MIN	1.368
MAX	25.900
(7.688 - pH)	-0.712
(pH - 7.688)	0.712
Early LS Present Criterion (mg N	0.619
Early LS Absent Criterion (mg N/	0.619
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.619

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.400
(7.204 - pH)	-1.196
(pH - 7.204)	1.196
Trout Present Criterion (mg N/l	2.593
Trout Absent Criterion (mg N/L	3.883
Trout Present?	n
Effective Criterion (mg N/L)	3.883

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	16.900
90th Percentile pH (SU)	8.400
MIN	2.444
MAX	16.900
(7.688 - pH)	-0.712
(pH - 7.688)	0.712
Early LS Present Criterion (mg N	1.106
Early LS Absent Criterion (mg N/	1.106
Early Life Stages Present?	y
Effective Criterion (mg N/L)	1.106

Outfall 001

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: GP Big Island (Outfall 001) Permit No.: VA0003026

Receiving Stream: James River Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	104 mg/L	1Q10 (Annual) =	236 MGD	Annual - 1Q10 Mix =	0.8 %	Mean Hardness (as CaCO3) =	154 mg/L
90% Temperature (Annual) =	28 deg C	7Q10 (Annual) =	309 MGD	- 7Q10 Mix =	48.8 %	90% Temp (Annual) =	34 deg C
90% Temperature (Wet season) =	25 deg C	30Q10 (Annual) =	354 MGD	- 30Q10 Mix =	55.17 %	90% Temp (Wet season) =	27 deg C
90% Maximum pH =	8.6 SU	1Q10 (Wet season) =	465 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	8.3 SU
10% Maximum pH =	7.1 SU	30Q10 (Wet season)	663 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	6.9 SU
Tier Designation (1 or 2) =	2	30Q5 =	388 MGD			Discharge Flow =	0.12 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	961 MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	3.2E+06	--	--	na	9.9E+01	--	--	na	3.2E+05	--	--	na	3.2E+05
Acrolein	0	--	--	na	9.3E+00	--	--	na	3.0E+04	--	--	na	9.3E-01	--	--	na	3.0E+03	--	--	na	3.0E+03
Acrylonitrile[c]	0	--	--	na	2.5E+00	--	--	na	2.0E+04	--	--	na	2.5E-01	--	--	na	2.0E+03	--	--	na	2.0E+03
Aldrin [c]	0	3.0E+00	--	na	5.0E-04	5.0E+01	--	na	4.0E+00	7.5E-01	--	na	5.0E-05	1.5E+03	--	na	4.0E-01	5.0E+01	--	na	4.0E-01
Ammonia-N (mg/l) (Yearly)	0	2.78E+00	3.86E-01	na	--	4.6E+01	6.3E+02	na	--	6.63E-01	9.64E-02	na	--	1.3E+03	2.8E+02	na	--	4.6E+01	2.8E+02	na	--
Ammonia-N (mg/l) (High Flow)	0	2.65E+00	4.68E-01	na	--	1.0E+04	2.6E+03	na	--	6.63E-01	1.17E-01	na	--	2.6E+03	6.5E+02	na	--	2.6E+03	6.5E+02	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	1.3E+08	--	--	na	4.0E+03	--	--	na	1.3E+07	--	--	na	1.3E+07
Antimony	0	--	--	na	6.4E+02	--	--	na	2.1E+06	--	--	na	6.4E+01	--	--	na	2.1E+05	--	--	na	2.1E+05
Arsenic	o	3.4E+02	1.5E+02	na	--	5.7E+03	1.9E+05	na	--	8.5E+01	3.8E+01	na	--	1.7E+05	9.7E+04	na	--	5.7E+03	9.7E+04	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Benzene [c]	0	--	--	na	5.1E+02	--	--	na	4.1E+06	--	--	na	5.1E+01	--	--	na	4.1E+05	--	--	na	4.1E+05
Benzidine[c]	0	--	--	na	2.0E-03	--	--	na	1.6E+01	--	--	na	2.0E-04	--	--	na	1.6E+00	--	--	na	1.6E+00
Benzo (a) anthracene [c]	0	--	--	na	1.8E-01	--	--	na	1.4E+03	--	--	na	1.8E-02	--	--	na	1.4E+02	--	--	na	1.4E+02
Benzo (b) fluoranthene [c]	0	--	--	na	1.8E-01	--	--	na	1.4E+03	--	--	na	1.8E-02	--	--	na	1.4E+02	--	--	na	1.4E+02
Benzo (k) fluoranthene [c]	0	--	--	na	1.8E-01	--	--	na	1.4E+03	--	--	na	1.8E-02	--	--	na	1.4E+02	--	--	na	1.4E+02
Benzo (a) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.4E+03	--	--	na	1.8E-02	--	--	na	1.4E+02	--	--	na	1.4E+02
Bis2-Chloroethyl Ether [c]	0	--	--	na	5.3E+00	--	--	na	4.2E+04	--	--	na	5.3E-01	--	--	na	4.2E+03	--	--	na	4.2E+03
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	2.1E+08	--	--	na	6.5E+03	--	--	na	2.1E+07	--	--	na	2.1E+07
Bis 2-Ethylhexyl Phthalate [c]	0	--	--	na	2.2E+01	--	--	na	1.8E+05	--	--	na	2.2E+00	--	--	na	1.8E+04	--	--	na	1.8E+04
Bromoform [c]	0	--	--	na	1.4E+03	--	--	na	1.1E+07	--	--	na	1.4E+02	--	--	na	1.1E+06	--	--	na	1.1E+06
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	6.1E+06	--	--	na	1.9E+02	--	--	na	6.1E+05	--	--	na	6.1E+05
Cadmium	0	4.2E+00	1.2E+00	na	--	7.1E+01	1.5E+03	na	--	1.0E+00	2.9E-01	na	--	2.0E+03	7.5E+02	na	--	7.1E+01	7.5E+02	na	--
Carbon Tetrachloride [c]	0	--	--	na	1.6E+01	--	--	na	1.3E+05	--	--	na	1.6E+00	--	--	na	1.3E+04	--	--	na	1.3E+04
Chlordane [c]	0	2.4E+00	4.3E-03	na	8.1E-03	4.0E+01	5.4E+00	na	6.5E+01	6.0E-01	1.1E-03	na	8.1E-04	1.2E+03	2.8E+00	na	6.5E+00	4.0E+01	2.8E+00	na	6.5E+00
Chloride	0	8.6E+05	2.3E+05	na	--	1.4E+07	2.9E+08	na	--	2.2E+05	5.8E+04	na	--	4.2E+08	1.5E+08	na	--	1.4E+07	1.5E+08	na	--
TRC	0	1.9E+01	1.1E+01	na	--	3.2E+02	1.4E+04	na	--	4.8E+00	2.8E+00	na	--	9.3E+03	7.1E+03	na	--	3.2E+02	7.1E+03	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	5.2E+06	--	--	na	1.6E+02	--	--	na	5.2E+05	--	--	na	5.2E+05

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.0E+06	--	--	na	1.3E+01	--	--	na	1.0E+05	--	--	na	**1.0E+05**
Chloroform	0	--	--	na	1.1E+04	--	--	na	3.6E+07	--	--	na	1.1E+03	--	--	na	3.6E+06	--	--	na	**3.6E+06**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	5.2E+06	--	--	na	1.6E+02	--	--	na	5.2E+05	--	--	na	**5.2E+05**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	4.9E+05	--	--	na	1.5E+01	--	--	na	4.9E+04	--	--	na	**4.9E+04**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.4E+00	5.2E+01	na	--	2.1E-02	1.0E-02	na	--	4.1E+01	2.6E+01	na	--	**1.4E+00**	**2.6E+01**	na	--
Chromium III	0	6.0E+02	7.7E+01	na	--	1.0E+04	9.6E+04	na	--	1.5E+02	1.9E+01	na	--	2.9E+05	4.9E+04	na	--	**1.0E+04**	**4.9E+04**	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	2.7E+02	1.4E+04	na	--	4.0E+00	2.8E+00	na	--	7.9E+03	7.1E+03	na	--	**2.7E+02**	**7.1E+03**	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	3.2E+04	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	1.4E+02	--	--	na	1.8E-03	--	--	na	1.4E+01	--	--	na	**1.4E+01**
Copper	0	1.4E+01	9.3E+00	na	--	2.4E+02	1.2E+04	na	--	3.5E+00	2.3E+00	na	--	6.9E+03	6.0E+03	na	--	**2.4E+02**	**6.0E+03**	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	3.7E+02	6.5E+03	na	5.2E+07	5.5E+00	1.3E+00	na	1.6E+03	1.1E+04	3.3E+03	na	5.2E+06	**3.7E+02**	**3.3E+03**	na	**5.2E+06**
DDD[C]	0	--	--	na	3.1E-03	--	--	na	2.5E+01	--	--	na	3.1E-04	--	--	na	2.5E+00	--	--	na	**2.5E+00**
DDE[C]	0	--	--	na	2.2E-03	--	--	na	1.8E+01	--	--	na	2.2E-04	--	--	na	1.8E+00	--	--	na	**1.8E+00**
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.8E+01	1.3E+00	na	1.8E+01	2.8E-01	2.5E-04	na	2.2E-04	5.4E+02	6.4E-01	na	1.8E+00	**1.8E+01**	**6.4E-01**	na	**1.8E+00**
Demeton	0	--	1.0E-01	na	--	--	1.3E+02	na	--	--	2.5E-02	na	--	--	6.4E+01	na	--	--	**6.4E+01**	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	2.8E+00	2.1E+02	na	--	4.3E-02	4.3E-02	na	--	8.4E+01	1.1E+02	na	--	**2.8E+00**	**1.1E+02**	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	1.4E+03	--	--	na	1.8E-02	--	--	na	1.4E+02	--	--	na	**1.4E+02**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	4.2E+06	--	--	na	1.3E+02	--	--	na	4.2E+05	--	--	na	**4.2E+05**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	3.1E+06	--	--	na	9.6E+01	--	--	na	3.1E+05	--	--	na	**3.1E+05**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	6.1E+05	--	--	na	1.9E+01	--	--	na	6.1E+04	--	--	na	**6.1E+04**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.2E+03	--	--	na	2.8E-02	--	--	na	2.2E+02	--	--	na	**2.2E+02**
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	1.4E+06	--	--	na	1.7E+01	--	--	na	1.4E+05	--	--	na	**1.4E+05**
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	3.0E+06	--	--	na	3.7E+01	--	--	na	3.0E+05	--	--	na	**3.0E+05**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	2.3E+07	--	--	na	7.1E+02	--	--	na	2.3E+06	--	--	na	**2.3E+06**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	3.2E+07	--	--	na	1.0E+03	--	--	na	3.2E+06	--	--	na	**3.2E+06**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	9.4E+05	--	--	na	2.9E+01	--	--	na	9.4E+04	--	--	na	**9.4E+04**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.2E+06	--	--	na	1.5E+01	--	--	na	1.2E+05	--	--	na	**1.2E+05**
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	1.7E+06	--	--	na	2.1E+01	--	--	na	1.7E+05	--	--	na	**1.7E+05**
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	4.0E+00	7.0E+01	na	4.3E+00	6.0E-02	1.4E-02	na	5.4E-05	1.2E+02	3.6E+01	na	4.3E-01	**4.0E+00**	**3.6E+01**	na	**4.3E-01**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	1.4E+08	--	--	na	4.4E+03	--	--	na	1.4E+07	--	--	na	**1.4E+07**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	2.7E+06	--	--	na	8.5E+01	--	--	na	2.7E+05	--	--	na	**2.7E+05**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	3.6E+09	--	--	na	1.1E+05	--	--	na	3.6E+08	--	--	na	**3.6E+08**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	1.5E+07	--	--	na	4.5E+02	--	--	na	1.5E+06	--	--	na	**1.5E+06**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.7E+07	--	--	na	5.3E+02	--	--	na	1.7E+06	--	--	na	**1.7E+06**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	9.1E+05	--	--	na	2.8E+01	--	--	na	9.1E+04	--	--	na	**9.1E+04**
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	2.7E+05	--	--	na	3.4E+00	--	--	na	2.7E+04	--	--	na	**2.7E+04**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	1.6E-04	--	--	na	5.1E-09	--	--	na	1.6E-05	--	--	na	**1.6E-05**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	1.6E+04	--	--	na	2.0E-01	--	--	na	1.6E+03	--	--	na	**1.6E+03**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.7E+00	7.0E+01	na	2.9E+05	5.5E-02	1.4E-02	na	8.9E+00	1.1E+02	3.6E+01	na	2.9E+04	**3.7E+00**	**3.6E+01**	na	**2.9E+04**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.7E+00	7.0E+01	na	2.9E+05	5.5E-02	1.4E-02	na	8.9E+00	1.1E+02	3.6E+01	na	2.9E+04	**3.7E+00**	**3.6E+01**	na	**2.9E+04**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	3.7E+00	7.0E+01	--	--	5.5E-02	1.4E-02	--	--	1.1E+02	3.6E+01	--	--	**3.7E+00**	**3.6E+01**	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	2.9E+05	--	--	na	8.9E+00	--	--	na	2.9E+04	--	--	na	**2.9E+04**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.4E+00	4.5E+01	na	1.9E+02	2.2E-02	9.0E-03	na	6.0E-03	4.2E+01	2.3E+01	na	1.9E+01	**1.4E+00**	**2.3E+01**	na	**1.9E+01**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	9.7E+02	--	--	na	3.0E-02	--	--	na	9.7E+01	--	--	na	**9.7E+01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	6.8E+06	--	--	na	2.1E+02	--	--	na	6.8E+05	--	--	na	6.8E+05
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	4.5E+05	--	--	na	1.4E+01	--	--	na	4.5E+04	--	--	na	4.5E+04
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.7E+07	--	--	na	5.3E+02	--	--	na	1.7E+06	--	--	na	1.7E+06
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.3E+01	na	--	--	2.5E-03	na	--	--	6.4E+00	na	--	--	6.4E+00	na	--
Heptachlor C	0	5.2E-01	3.8E-03	na	7.9E-04	8.7E+00	4.8E+00	na	6.3E+00	1.3E-01	9.5E-04	na	7.9E-05	2.6E+02	2.4E+00	na	6.3E-01	8.7E+00	2.4E+00	na	6.3E-01
Heptachlor Epoxide C	0	5.2E-01	3.8E-03	na	3.9E-04	8.7E+00	4.8E+00	na	3.1E+00	1.3E-01	9.5E-04	na	3.9E-05	2.6E+02	2.4E+00	na	3.1E-01	8.7E+00	2.4E+00	na	3.1E-01
Hexachlorobenzene C	0	--	--	na	2.9E-03	--	--	na	2.3E+01	--	--	na	2.9E-04	--	--	na	2.3E+00	--	--	na	2.3E+00
Hexachlorobutadiene C	0	--	--	na	1.8E+02	--	--	na	1.4E+06	--	--	na	1.8E+01	--	--	na	1.4E+05	--	--	na	1.4E+05
Hexachlorocyclohexane Alpha-BHC C	0	--	--	na	4.9E-02	--	--	na	3.9E+02	--	--	na	4.9E-03	--	--	na	3.9E+01	--	--	na	3.9E+01
Hexachlorocyclohexane Beta BHC C	0	--	--	na	1.7E-01	--	--	na	1.4E+03	--	--	na	1.7E-02	--	--	na	1.4E+02	--	--	na	1.4E+02
Hexachlorocyclohexane Gamma-BHC C (Lindane)	0	9.5E-01	na	na	1.8E+00	1.6E+01	--	na	1.4E+04	2.4E-01	--	na	1.8E-01	4.7E+02	--	na	1.4E+03	1.6E+01	--	na	1.4E+03
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	3.6E+06	--	--	na	1.1E+02	--	--	na	3.6E+05	--	--	na	3.6E+05
Hexachloroethane C	0	--	--	na	3.3E+01	--	--	na	2.6E+05	--	--	na	3.3E+00	--	--	na	2.6E+04	--	--	na	2.6E+04
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.5E+03	na	--	--	5.0E-01	na	--	--	1.3E+03	na	--	--	1.3E+03	na	--
Indeno (1,2,3-cd) pyrene C	0	--	--	na	1.8E-01	--	--	na	1.4E+03	--	--	na	1.8E-02	--	--	na	1.4E+02	--	--	na	1.4E+02
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone C	0	--	--	na	9.6E+03	--	--	na	7.7E+07	--	--	na	9.6E+02	--	--	na	7.7E+06	--	--	na	7.7E+06
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Lead	0	1.3E+02	1.4E+01	na	--	2.2E+03	1.8E+04	na	--	3.1E+01	3.6E+00	na	--	6.2E+04	9.1E+03	na	--	2.2E+03	9.1E+03	na	--
Malathion	0	--	1.0E-01	na	--	--	1.3E+02	na	--	--	2.5E-02	na	--	--	6.4E+01	na	--	--	6.4E+01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	2.3E+01	9.7E+02	--	--	3.5E-01	1.9E-01	--	--	6.9E+02	5.0E+02	--	--	2.3E+01	5.0E+02	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	4.9E+06	--	--	na	1.5E+02	--	--	na	4.9E+05	--	--	na	4.9E+05
Methylene Chloride C	0	--	--	na	5.9E+03	--	--	na	4.7E+07	--	--	na	5.9E+02	--	--	na	4.7E+06	--	--	na	4.7E+06
Methoxychlor	0	--	3.0E-02	na	--	--	3.8E+01	na	--	--	7.5E-03	na	--	--	1.9E+01	na	--	--	1.9E+01	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Nickel	0	1.9E+02	2.1E+01	na	4.6E+03	3.2E+03	2.6E+04	na	1.5E+07	4.7E+01	5.2E+00	na	4.6E+02	9.3E+04	1.3E+04	na	1.5E+06	3.2E+03	1.3E+04	na	1.5E+06
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	2.2E+06	--	--	na	6.9E+01	--	--	na	2.2E+05	--	--	na	2.2E+05
N-Nitrosodimethylamine C	0	--	--	na	3.0E+01	--	--	na	2.4E+05	--	--	na	3.0E+00	--	--	na	2.4E+04	--	--	na	2.4E+04
N-Nitrosodiphenylamine C	0	--	--	na	6.0E+01	--	--	na	4.8E+05	--	--	na	6.0E+00	--	--	na	4.8E+04	--	--	na	4.8E+04
N-Nitrosodi-n-propylamine C	0	--	--	na	5.1E+00	--	--	na	4.1E+04	--	--	na	5.1E-01	--	--	na	4.1E+03	--	--	na	4.1E+03
Nonylphenol	0	2.8E+01	6.6E+00	--	--	4.7E+02	8.3E+03	na	--	7.0E+00	1.7E+00	--	--	1.4E+04	4.3E+03	--	--	4.7E+02	4.3E+03	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	1.1E+00	1.6E+01	na	--	1.6E-02	3.3E-03	na	--	3.2E+01	8.4E+00	na	--	1.1E+00	8.4E+00	na	--
PCB Total C	0	--	1.4E-02	na	6.4E-04	--	1.8E+01	na	5.1E+00	--	3.5E-03	na	6.4E-05	--	9.0E+00	na	5.1E-01	--	9.0E+00	na	5.1E-01
Pentachlorophenol C	0	9.5E+00	7.4E+00	na	3.0E+01	1.6E+02	9.3E+03	na	2.4E+05	2.4E+00	1.8E+00	na	3.0E+00	4.7E+03	4.8E+03	na	2.4E+04	1.6E+02	4.8E+03	na	2.4E+04
Phenol	0	--	--	na	8.6E+05	--	--	na	2.8E+09	--	--	na	8.6E+04	--	--	na	2.8E+08	--	--	na	2.8E+08
Pyrene	0	--	--	na	4.0E+03	--	--	na	1.3E+07	--	--	na	4.0E+02	--	--	na	1.3E+06	--	--	na	1.3E+06
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	1.3E+04	--	--	na	4.0E-01	--	--	na	1.3E+03	--	--	na	1.3E+03
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter	Background	*Water Quality Criteria*				*Wasteload Allocations*				*Antidegradation Baseline*				*Antidegradation Allocations*				***Most Limiting Allocations***			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	3.3E+02	6.3E+03	na	1.4E+07	5.0E+00	1.3E+00	na	4.2E+02	9.8E+03	3.2E+03	na	1.4E+06	**3.3E+02**	**3.2E+03**	**na**	**1.4E+06**
Silver	0	3.9E+00	--	na	--	6.5E+01	--	na	--	9.2E-01	--	na	--	1.8E+03	--	na	--	**6.5E+01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	3.2E+05	--	--	na	4.0E+00	--	--	na	3.2E+04	**--**	**--**	**na**	**3.2E+04**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	2.6E+05	--	--	na	3.3E+00	--	--	na	2.6E+04	**--**	**--**	**na**	**2.6E+04**
Thallium	0	--	--	na	4.7E-01	--	--	na	1.5E+03	--	--	na	4.7E-02	--	--	na	1.5E+02	**--**	**--**	**na**	**1.5E+02**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.9E+07	--	--	na	6.0E+02	--	--	na	1.9E+06	**--**	**--**	**na**	**1.9E+06**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	1.2E+01	2.5E-01	na	2.2E+01	1.8E-01	5.0E-05	na	2.8E-04	3.6E+02	1.3E-01	na	2.2E+00	**1.2E+01**	**1.3E-01**	**na**	**2.2E+00**
Tributyltin	0	4.6E-01	7.2E-02	na	--	7.7E+00	9.1E+01	na	--	1.2E-01	1.8E-02	na	--	2.3E+02	4.6E+01	na	--	**7.7E+00**	**4.6E+01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	2.3E+05	--	--	na	7.0E+00	--	--	na	2.3E+04	**--**	**--**	**na**	**2.3E+04**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.3E+06	--	--	na	1.6E+01	--	--	na	1.3E+05	**--**	**--**	**na**	**1.3E+05**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	2.4E+06	--	--	na	3.0E+01	--	--	na	2.4E+05	**--**	**--**	**na**	**2.4E+05**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	1.9E+05	--	--	na	2.4E+00	--	--	na	1.9E+04	**--**	**--**	**na**	**1.9E+04**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	1.9E+05	--	--	na	2.4E+00	--	--	na	1.9E+04	**--**	**--**	**na**	**1.9E+04**
Zinc	0	1.2E+02	1.2E+02	na	2.6E+04	2.1E+03	1.5E+05	na	8.4E+07	3.0E+01	3.1E+01	na	2.6E+03	6.0E+04	7.9E+04	na	8.4E+06	**2.1E+03**	**7.9E+04**	**na**	**8.4E+06**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	2.1E+05
Arsenic	2.3E+03
Barium	na
Cadmium	2.8E+01
Chromium III	4.0E+03
Chromium VI	1.1E+02
Copper	9.6E+01
Iron	na
Lead	8.7E+02
Manganese	na
Mercury	9.4E+00
Nickel	1.3E+03
Selenium	1.3E+02
Silver	2.6E+01
Zinc	8.3E+02

Note: do not use QL's lower than the minimum QL's provided in agency guidance

0.120 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD 0.120

	Stream Flows Allocated to Mix (MGD) Dry Season	Wet Season	Total Mix Flows Stream + Discharge (MGD) Dry Season	Wet Season
1Q10	1.888	465.000	2.008	465.120
7Q10	150.792	N/A	150.912	N/A
30Q10	195.302	663.000	195.422	663.120
30Q5	388.000	N/A	388.120	N/A
Harm. Mean	961.000	N/A	961.120	N/A
Annual Avg.	0.000	N/A	0.120	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	28.359	25.001
30Q10 90th% Temp. Mix (deg C)	28.004	25.000
1Q10 90th% pH Mix (SU)	8.575	8.600
30Q10 90th% pH Mix (SU)	8.600	8.600
1Q10 10th% pH Mix (SU)	7.085	N/A
7Q10 10th% pH Mix (SU)	7.100	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	107.0	107.0
7Q10 Hardness (mg/L as CaCO3)	104.0	104.0

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.575
(7.204 - pH)	-1.371
(pH - 7.204)	1.371
Trout Present Criterion (mg N/l	1.856
Trout Absent Criterion (mg N/L	2.779
Trout Present?	n
Effective Criterion (mg N/L)	2.779

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	28.004
90th Percentile pH (SU)	8.600
MIN	1.195
MAX	28.004
(7.688 - pH)	-0.912
(pH - 7.688)	0.912
Early LS Present Criterion (mg N	0.386
Early LS Absent Criterion (mg N/	0.386
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.386

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.600
(7.204 - pH)	-1.396
(pH - 7.204)	1.396
Trout Present Criterion (mg N/l	1.771
Trout Absent Criterion (mg N/L	2.651
Trout Present?	n
Effective Criterion (mg N/L)	2.651

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	25.000
90th Percentile pH (SU)	8.600
MIN	1.450
MAX	25.000
(7.688 - pH)	-0.912
(pH - 7.688)	0.912
Early LS Present Criterion (mg N	0.468
Early LS Absent Criterion (mg N/	0.468
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.468

0.120 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD 0.120

	100% Stream Flows Allocated to Mix (MGD) Dry Season	Wet Season	Total Mix Flows Stream + Discharge (MGD) Dry Season	Wet Season
1Q10	236.000	465.000	236.120	465.120
7Q10	309.000	N/A	309.120	N/A
30Q10	354.000	663.000	354.120	663.120
30Q5	388.000	N/A	388.120	N/A
Harm. Mean	961.000	N/A	961.120	N/A
Annual Avg.	0.000	N/A	0.120	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	28.003	25.001
30Q10 90th% Temp. Mix (deg C)	28.002	25.000
1Q10 90th% pH Mix (SU)	8.600	8.600
30Q10 90th% pH Mix (SU)	8.600	8.600
1Q10 10th% pH Mix (SU)	7.100	N/A
7Q10 10th% pH Mix (SU)	7.100	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	104.025	104.025
7Q10 Hardness (mg/L as CaCO3) =	104.019	104.019

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.600
(7.204 - pH)	-1.396
(pH - 7.204)	1.396
Trout Present Criterion (mg N/l	1.772
Trout Absent Criterion (mg N/L	2.652
Trout Present?	n
Effective Criterion (mg N/L)	2.652

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	28.002
90th Percentile pH (SU)	8.600
MIN	1.195
MAX	28.002
(7.688 - pH)	-0.912
(pH - 7.688)	0.912
Early LS Present Criterion (mg N	0.386
Early LS Absent Criterion (mg N/	0.386
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.386

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.600
(7.204 - pH)	-1.396
(pH - 7.204)	1.396
Trout Present Criterion (mg N/l	1.771
Trout Absent Criterion (mg N/L	2.651
Trout Present?	n
Effective Criterion (mg N/L)	2.651

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	25.000
90th Percentile pH (SU)	8.600
MIN	1.450
MAX	25.000
(7.688 - pH)	-0.912
(pH - 7.688)	0.912
Early LS Present Criterion (mg N	0.468
Early LS Absent Criterion (mg N/	0.468
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.468

Outfall 002

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: GP Big Island (Outfall 002)   Permit No.: VA0003026

Receiving Stream: James River   Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	104 mg/L
90% Temperature (Annual) =	28 deg C
90% Temperature (Wet season) =	25 deg C
90% Maximum pH =	8.6 SU
10% Maximum pH =	7.1 SU
Tier Designation (1 or 2) =	2
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	236 MGD
7Q10 (Annual) =	310 MGD
30Q10 (Annual) =	354 MGD
1Q10 (Wet season) =	466 MGD
30Q10 (Wet season)	663 MGD
30Q5 =	388 MGD
Harmonic Mean =	961 MGD

Mixing Information

Annual - 1Q10 Mix =	0.81 %
- 7Q10 Mix =	49.45 %
- 30Q10 Mix =	55.67 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	96 mg/L
90% Temp (Annual) =	36 deg C
90% Temp (Wet season) =	30 deg C
90% Maximum pH =	8.5 SU
10% Maximum pH =	7 SU
Discharge Flow =	3.65 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.1E+05	--	--	na	9.9E+01	--	--	na	1.1E+04	--	--	na	1.1E+04
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.0E+03	--	--	na	9.3E-01	--	--	na	1.0E+02	--	--	na	1.0E+02
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	6.6E+02	--	--	na	2.5E-01	--	--	na	6.6E+01	--	--	na	6.6E+01
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	4.6E+00	--	na	1.3E-01	7.5E-01	--	na	5.0E-05	4.9E+01	--	na	1.3E-02	4.6E+00	--	na	1.3E-02
Ammonia-N (mg/l) (Yearly)	0	3.01E+00	3.83E-01	na	--	4.6E+00	2.1E+01	na	--	6.65E-01	9.61E-02	na	--	4.4E+01	9.4E+00	na	--	4.6E+00	9.4E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	2.66E+00	4.68E-01	na	--	3.4E+02	8.5E+01	na	--	6.64E-01	1.17E-01	na	--	8.5E+01	2.1E+01	na	--	8.5E+01	2.1E+01	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.3E+06	--	--	na	4.0E+03	--	--	na	4.3E+05	--	--	na	4.3E+05
Antimony	0	--	--	na	6.4E+02	--	--	na	6.9E+04	--	--	na	6.4E+01	--	--	na	6.9E+03	--	--	na	6.9E+03
Arsenic	0	3.4E+02	1.5E+02	na	--	5.2E+02	6.4E+03	na	--	8.5E+01	3.8E+01	na	--	5.6E+03	3.2E+03	na	--	5.2E+02	3.2E+03	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	1.3E+05	--	--	na	5.1E+01	--	--	na	1.3E+04	--	--	na	1.3E+04
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	5.3E-01	--	--	na	2.0E-04	--	--	na	5.3E-02	--	--	na	5.3E-02
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	4.8E+01	--	--	na	1.8E-02	--	--	na	4.8E+00	--	--	na	4.8E+00
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	4.8E+01	--	--	na	1.8E-02	--	--	na	4.8E+00	--	--	na	4.8E+00
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	4.8E+01	--	--	na	1.8E-02	--	--	na	4.8E+00	--	--	na	4.8E+00
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	4.8E+01	--	--	na	1.8E-02	--	--	na	4.8E+00	--	--	na	4.8E+00
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	1.4E+03	--	--	na	5.3E-01	--	--	na	1.4E+02	--	--	na	1.4E+02
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	7.0E+06	--	--	na	6.5E+03	--	--	na	7.0E+05	--	--	na	7.0E+05
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	5.8E+03	--	--	na	2.2E+00	--	--	na	5.8E+02	--	--	na	5.8E+02
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	3.7E+05	--	--	na	1.4E+02	--	--	na	3.7E+04	--	--	na	3.7E+04
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	2.0E+05	--	--	na	1.9E+02	--	--	na	2.0E+04	--	--	na	2.0E+04
Cadmium	0	3.9E+00	1.2E+00	na	--	5.9E+00	5.0E+01	na	--	1.0E+00	2.9E-01	na	--	6.7E+01	2.5E+01	na	--	5.9E+00	2.5E+01	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	4.2E+03	--	--	na	1.6E+00	--	--	na	4.2E+02	--	--	na	4.2E+02
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	3.7E+00	1.8E-01	na	2.1E+00	6.0E-01	1.1E-03	na	8.1E-04	3.9E+01	9.2E-02	na	2.1E-01	3.7E+00	9.2E-02	na	2.1E-01
Chloride	0	8.6E+05	2.3E+05	na	--	1.3E+06	9.9E+06	na	--	2.2E+05	5.8E+04	na	--	1.4E+07	4.9E+06	na	--	1.3E+06	4.9E+06	na	--
TRC	0	1.9E+01	1.1E+01	na	--	2.9E+01	4.7E+02	na	--	4.8E+00	2.8E+00	na	--	3.1E+02	2.4E+02	na	--	2.9E+01	2.4E+02	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.7E+05	--	--	na	1.6E+02	--	--	na	1.7E+04	--	--	na	1.7E+04

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	3.4E+04	--	--	na	1.3E+01	--	--	na	3.4E+03	**--**	**--**	**na**	**3.4E+03**
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.2E+06	--	--	na	1.1E+03	--	--	na	1.2E+05	**--**	**--**	**na**	**1.2E+05**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.7E+05	--	--	na	1.6E+02	--	--	na	1.7E+04	**--**	**--**	**na**	**1.7E+04**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.6E+04	--	--	na	1.5E+01	--	--	na	1.6E+03	**--**	**--**	**na**	**1.6E+03**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.3E-01	1.8E+00	na	--	2.1E-02	1.0E-02	na	--	1.4E+00	8.8E-01	na	--	**1.3E-01**	**8.8E-01**	**na**	**--**
Chromium III	0	5.6E+02	7.6E+01	na	--	8.6E+02	3.3E+03	na	--	1.5E+02	1.9E+01	na	--	9.6E+03	1.6E+03	na	--	**8.6E+02**	**1.6E+03**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	2.4E+01	4.7E+02	na	--	4.0E+00	2.8E+00	na	--	2.6E+02	2.4E+02	na	--	**2.4E+01**	**2.4E+02**	**na**	**--**
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	1.1E+03	--	**--**	**--**	**na**	**--**
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	4.8E+00	--	--	na	1.8E-03	--	--	na	4.8E-01	**--**	**--**	**na**	**4.8E-01**
Copper	0	1.3E+01	9.2E+00	na	--	2.0E+01	4.0E+02	na	--	3.5E+00	2.3E+00	na	--	2.3E+02	2.0E+02	na	--	**2.0E+01**	**2.0E+02**	**na**	**--**
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	3.4E+01	2.2E+02	na	1.7E+06	5.5E+00	1.3E+00	na	1.6E+03	3.6E+02	1.1E+02	na	1.7E+05	**3.4E+01**	**1.1E+02**	**na**	**1.7E+05**
DDD [C]	0	--	--	na	3.1E-03	--	--	na	8.2E-01	--	--	na	3.1E-04	--	--	na	8.2E-02	**--**	**--**	**na**	**8.2E-02**
DDE [C]	0	--	--	na	2.2E-03	--	--	na	5.8E-01	--	--	na	2.2E-04	--	--	na	5.8E-02	**--**	**--**	**na**	**5.8E-02**
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.7E+00	4.3E-02	na	5.8E-01	2.8E-01	2.5E-04	na	2.2E-04	1.8E+01	2.1E-02	na	5.8E-02	**1.7E+00**	**2.1E-02**	**na**	**5.8E-02**
Demeton	0	--	1.0E-01	na	--	--	4.3E+00	na	--	--	2.5E-02	na	--	--	2.1E+00	na	--	**--**	**2.1E+00**	**na**	**--**
Diazinon	0	1.7E-01	1.7E-01	na	--	2.6E-01	7.3E+00	na	--	4.3E-02	4.3E-02	na	--	2.8E+00	3.7E+00	na	--	**2.6E-01**	**3.7E+00**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	4.8E+01	--	--	na	1.8E-02	--	--	na	4.8E+00	**--**	**--**	**na**	**4.8E+00**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.4E+05	--	--	na	1.3E+02	--	--	na	1.4E+04	**--**	**--**	**na**	**1.4E+04**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.0E+05	--	--	na	9.6E+01	--	--	na	1.0E+04	**--**	**--**	**na**	**1.0E+04**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	2.0E+04	--	--	na	1.9E+01	--	--	na	2.0E+03	**--**	**--**	**na**	**2.0E+03**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	7.4E+01	--	--	na	2.8E-02	--	--	na	7.4E+00	**--**	**--**	**na**	**7.4E+00**
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	4.5E+04	--	--	na	1.7E+01	--	--	na	4.5E+03	**--**	**--**	**na**	**4.5E+03**
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	9.8E+04	--	--	na	3.7E+01	--	--	na	9.8E+03	**--**	**--**	**na**	**9.8E+03**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.6E+05	--	--	na	7.1E+02	--	--	na	7.6E+04	**--**	**--**	**na**	**7.6E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.1E+06	--	--	na	1.0E+03	--	--	na	1.1E+05	**--**	**--**	**na**	**1.1E+05**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	3.1E+04	--	--	na	2.9E+01	--	--	na	3.1E+03	**--**	**--**	**na**	**3.1E+03**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	4.0E+04	--	--	na	1.5E+01	--	--	na	4.0E+03	**--**	**--**	**na**	**4.0E+03**
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	5.6E+04	--	--	na	2.1E+01	--	--	na	5.6E+03	**--**	**--**	**na**	**5.6E+03**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	3.7E-01	2.4E+00	na	1.4E-01	6.0E-02	1.4E-02	na	5.4E-05	3.9E+00	1.2E+00	na	1.4E-02	**3.7E-01**	**1.2E+00**	**na**	**1.4E-02**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.7E+06	--	--	na	4.4E+03	--	--	na	4.7E+05	**--**	**--**	**na**	**4.7E+05**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	9.1E+04	--	--	na	8.5E+01	--	--	na	9.1E+03	**--**	**--**	**na**	**9.1E+03**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.2E+08	--	--	na	1.1E+05	--	--	na	1.2E+07	**--**	**--**	**na**	**1.2E+07**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.8E+05	--	--	na	4.5E+02	--	--	na	4.8E+04	**--**	**--**	**na**	**4.8E+04**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.7E+05	--	--	na	5.3E+02	--	--	na	5.7E+04	**--**	**--**	**na**	**5.7E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	3.0E+04	--	--	na	2.8E+01	--	--	na	3.0E+03	**--**	**--**	**na**	**3.0E+03**
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	9.0E+03	--	--	na	3.4E+00	--	--	na	9.0E+02	**--**	**--**	**na**	**9.0E+02**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.5E-06	--	--	na	5.1E-09	--	--	na	5.5E-07	**--**	**--**	**na**	**5.5E-07**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	5.3E+02	--	--	na	2.0E-01	--	--	na	5.3E+01	**--**	**--**	**na**	**5.3E+01**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.4E-01	2.4E+00	na	9.5E+03	5.5E-02	1.4E-02	na	8.9E+00	3.6E+00	1.2E+00	na	9.5E+02	**3.4E-01**	**1.2E+00**	**na**	**9.5E+02**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	3.4E-01	2.4E+00	na	9.5E+03	5.5E-02	1.4E-02	na	8.9E+00	3.6E+00	1.2E+00	na	9.5E+02	**3.4E-01**	**1.2E+00**	**na**	**9.5E+02**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	3.4E-01	2.4E+00	--	--	5.5E-02	1.4E-02	--	--	3.6E+00	1.2E+00	--	--	**3.4E-01**	**1.2E+00**	**--**	**--**
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	9.5E+03	--	--	na	8.9E+00	--	--	na	9.5E+02	**--**	**--**	**na**	**9.5E+02**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.3E-01	1.5E+00	na	6.4E+00	2.2E-02	9.0E-03	na	6.0E-03	1.4E+00	7.7E-01	na	6.4E-01	**1.3E-01**	**7.7E-01**	**na**	**6.4E-01**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.2E+01	--	--	na	3.0E-02	--	--	na	3.2E+00	**--**	**--**	**na**	**3.2E+00**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.3E+05	--	--	na	2.1E+02	--	--	na	2.3E+04	--	--	na	**2.3E+04**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.5E+04	--	--	na	1.4E+01	--	--	na	1.5E+03	--	--	na	**1.5E+03**
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.7E+05	--	--	na	5.3E+02	--	--	na	5.7E+04	--	--	na	**5.7E+04**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	4.3E-01	na	--	--	2.5E-03	na	--	--	2.1E-01	na	--	--	**2.1E-01**	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	7.9E-01	1.6E-01	na	2.1E-01	1.3E-01	9.5E-04	na	7.9E-05	8.5E+00	8.2E-02	na	2.1E-02	**7.9E-01**	**8.2E-02**	na	**2.1E-02**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	7.9E-01	1.6E-01	na	1.0E-01	1.3E-01	9.5E-04	na	3.9E-05	8.5E+00	8.2E-02	na	1.0E-02	**7.9E-01**	**8.2E-02**	na	**1.0E-02**
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	7.7E-01	--	--	na	2.9E-04	--	--	na	7.7E-02	--	--	na	**7.7E-02**
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	4.8E+04	--	--	na	1.8E+01	--	--	na	4.8E+03	--	--	na	**4.8E+03**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	1.3E+01	--	--	na	4.9E-03	--	--	na	1.3E+00	--	--	na	**1.3E+00**
Hexachlorocyclohexane Beta BHC[C]	0	--	--	na	1.7E-01	--	--	na	4.5E+01	--	--	na	1.7E-02	--	--	na	4.5E+00	--	--	na	**4.5E+00**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.4E+00	--	na	4.8E+02	2.4E-01	--	na	1.8E-01	1.6E+01	--	na	4.8E+01	**1.4E+00**	--	na	**4.8E+01**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.2E+05	--	--	na	1.1E+02	--	--	na	1.2E+04	--	--	na	**1.2E+04**
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	8.7E+03	--	--	na	3.3E+00	--	--	na	8.7E+02	--	--	na	**8.7E+02**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	8.6E+01	na	--	--	5.0E-01	na	--	--	4.3E+01	na	--	--	**4.3E+01**	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	4.8E+01	--	--	na	1.8E-02	--	--	na	4.8E+00	--	--	na	**4.8E+00**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	2.5E+06	--	--	na	9.6E+02	--	--	na	2.5E+05	--	--	na	**2.5E+05**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Lead	0	1.2E+02	1.4E+01	na	--	1.8E+02	6.1E+02	na	--	3.1E+01	3.5E+00	na	--	2.0E+03	3.0E+02	na	--	**1.8E+02**	**3.0E+02**	na	--
Malathion	0	--	1.0E-01	na	--	--	4.3E+00	na	--	--	2.5E-02	na	--	--	2.1E+00	na	--	--	**2.1E+00**	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	2.1E+00	3.3E+01	--	--	3.5E-01	1.9E-01	--	--	2.3E+01	1.7E+01	--	--	**2.1E+00**	**1.7E+01**	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.6E+05	--	--	na	1.5E+02	--	--	na	1.6E+04	--	--	na	**1.6E+04**
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	1.6E+06	--	--	na	5.9E+02	--	--	na	1.6E+05	--	--	na	**1.6E+05**
Methoxychlor	0	--	3.0E-02	na	--	--	1.3E+00	na	--	--	7.5E-03	na	--	--	6.4E-01	na	--	--	**6.4E-01**	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Nickel	0	1.8E+02	2.1E+01	na	4.6E+03	2.7E+02	9.0E+02	na	4.9E+05	4.7E+01	5.2E+00	na	4.6E+02	3.1E+03	4.5E+02	na	4.9E+04	**2.7E+02**	**4.5E+02**	na	**4.9E+04**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	7.4E+04	--	--	na	6.9E+01	--	--	na	7.4E+03	--	--	na	**7.4E+03**
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	7.9E+03	--	--	na	3.0E+00	--	--	na	7.9E+02	--	--	na	**7.9E+02**
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	1.6E+04	--	--	na	6.0E+00	--	--	na	1.6E+03	--	--	na	**1.6E+03**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	1.3E+03	--	--	na	5.1E-01	--	--	na	1.3E+02	--	--	na	**1.3E+02**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	4.3E+01	2.8E+02	na	--	7.0E+00	1.7E+00	--	--	4.6E+02	1.4E+02	--	--	**4.3E+01**	**1.4E+02**	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	9.9E-02	5.6E-01	na	--	1.6E-02	3.3E-03	na	--	1.1E+00	2.8E-01	na	--	**9.9E-02**	**2.8E-01**	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	6.0E-01	na	1.7E-01	--	3.5E-03	na	6.4E-05	--	3.0E-01	na	1.7E-02	--	**3.0E-01**	na	**1.7E-02**
Pentachlorophenol [C]	0	9.0E+00	7.4E+00	na	3.0E+01	1.4E+01	3.2E+02	na	7.9E+03	2.4E+00	1.8E+00	na	3.0E+00	1.6E+02	1.6E+02	na	7.9E+02	**1.4E+01**	**1.6E+02**	na	**7.9E+02**
Phenol	0	--	--	na	8.6E+05	--	--	na	9.2E+07	--	--	na	8.6E+04	--	--	na	9.2E+06	--	--	na	**9.2E+06**
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.3E+05	--	--	na	4.0E+02	--	--	na	4.3E+04	--	--	na	**4.3E+04**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.3E+02	--	--	na	4.0E-01	--	--	na	4.3E+01	--	--	na	**4.3E+01**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	3.0E+01	2.1E+02	na	4.5E+05	5.0E+00	1.3E+00	na	4.2E+02	3.3E+02	1.1E+02	na	4.5E+04	**3.0E+01**	**1.1E+02**	**na**	**4.5E+04**
Silver	0	3.4E+00	--	na	--	5.1E+00	--	na	--	9.2E-01	--	na	--	6.0E+01	--	na	--	**5.1E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane^{C}	0	--	--	na	4.0E+01	--	--	na	1.1E+04	--	--	na	4.0E+00	--	--	na	1.1E+03	**--**	**--**	**na**	**1.1E+03**
Tetrachloroethylene^{C}	0	--	--	na	3.3E+01	--	--	na	8.7E+03	--	--	na	3.3E+00	--	--	na	8.7E+02	**--**	**--**	**na**	**8.7E+02**
Thallium	0	--	--	na	4.7E-01	--	--	na	5.0E+01	--	--	na	4.7E-02	--	--	na	5.0E+00	**--**	**--**	**na**	**5.0E+00**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.4E+05	--	--	na	6.0E+02	--	--	na	6.4E+04	**--**	**--**	**na**	**6.4E+04**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene ^{C}	0	7.3E-01	2.0E-04	na	2.8E-03	1.1E+00	8.6E-03	na	7.4E-01	1.8E-01	5.0E-05	na	2.8E-04	1.2E+01	4.3E-03	na	7.4E-02	**1.1E+00**	**4.3E-03**	**na**	**7.4E-02**
Tributyltin	0	4.6E-01	7.2E-02	na	--	7.0E-01	3.1E+00	na	--	1.2E-01	1.8E-02	na	--	7.6E+00	1.5E+00	na	--	**7.0E-01**	**1.5E+00**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.5E+03	--	--	na	7.0E+00	--	--	na	7.5E+02	**--**	**--**	**na**	**7.5E+02**
1,1,2-Trichloroethane^{C}	0	--	--	na	1.6E+02	--	--	na	4.2E+04	--	--	na	1.6E+01	--	--	na	4.2E+03	**--**	**--**	**na**	**4.2E+03**
Trichloroethylene ^{C}	0	--	--	na	3.0E+02	--	--	na	7.9E+04	--	--	na	3.0E+01	--	--	na	7.9E+03	**--**	**--**	**na**	**7.9E+03**
2,4,6-Trichlorophenol ^{C}	0	--	--	na	2.4E+01	--	--	na	6.3E+03	--	--	na	2.4E+00	--	--	na	6.3E+02	**--**	**--**	**na**	**6.3E+02**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride^{C}	0	--	--	na	2.4E+01	--	--	na	6.3E+03	--	--	na	2.4E+00	--	--	na	6.3E+02	**--**	**--**	**na**	**5.3E+02**
Zinc	0	1.2E+02	1.2E+02	na	2.6E+04	1.8E+02	5.2E+03	na	2.8E+06	3.0E+01	3.1E+01	na	2.6E+03	2.0E+03	2.6E+03	na	2.8E+05	**1.8E+02**	**2.6E+03**	**na**	**2.8E+05**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.9E+03
Arsenic	2.1E+02
Barium	na
Cadmium	2.4E+00
Chromium III	3.4E+02
Chromium VI	9.8E+00
Copper	8.1E+00
Iron	na
Lead	7.1E+01
Manganese	na
Mercury	8.5E-01
Nickel	1.1E+02
Selenium	1.2E+01
Silver	2.1E+00
Zinc	7.1E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

3.650 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGI 3.650

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	1.912	466.000	5.562	469.650
7Q10	153.295	N/A	156.945	N/A
30Q10	197.072	663.000	200.722	666.650
30Q5	388.000	N/A	391.650	N/A
Harm. Mean	961.000	N/A	964.650	N/A
Annual Avg.	0.000	N/A	3.650	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	33.250	25.039
30Q10 90th% Temp. Mix (deg C)	28.145	25.027
1Q10 90th% pH Mix (SU)	8.532	8.599
30Q10 90th% pH Mix (SU)	8.598	8.599
1Q10 10th% pH Mix (SU)	7.032	N/A
7Q10 10th% pH Mix (SU)	7.097	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	98.7	98.7
7Q10 Hardness (mg/L as CaCO3)	103.8	103.8

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.532
(7.204 - pH)	-1.328
(pH - 7.204)	1.328
Trout Present Criterion (mg N/l	2.014
Trout Absent Criterion (mg N/L	3.014
Trout Present?	n
Effective Criterion (mg N/L)	3.014

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	28.145
90th Percentile pH (SU)	8.598
MIN	1.184
MAX	28.145
(7.688 - pH)	-0.910
(pH - 7.688)	0.910
Early LS Present Criterion (mg N	0.383
Early LS Absent Criterion (mg N/	0.383
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.383

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.599
(7.204 - pH)	-1.395
(pH - 7.204)	1.395
Trout Present Criterion (mg N/l	1.774
Trout Absent Criterion (mg N/L	2.655
Trout Present?	n
Effective Criterion (mg N/L)	2.655

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	25.027
90th Percentile pH (SU)	8.599
MIN	1.447
MAX	25.027
(7.688 - pH)	-0.911
(pH - 7.688)	0.911
Early LS Present Criterion (mg N	0.468
Early LS Absent Criterion (mg N/	0.468
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.468

3.650 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGI 3.650

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	236.000	466.000	239.650	469.650
7Q10	310.000	N/A	313.650	N/A
30Q10	354.000	663.000	357.650	666.650
30Q5	388.000	N/A	391.650	N/A
Harm. Mean	961.000	N/A	964.650	N/A
Annual Avg.	0.000	N/A	3.650	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	28.122	25.039
30Q10 90th% Temp. Mix (deg C)	28.082	25.027
1Q10 90th% pH Mix (SU)	8.598	8.599
30Q10 90th% pH Mix (SU)	8.599	8.599
1Q10 10th% pH Mix (SU)	7.098	N/A
7Q10 10th% pH Mix (SU)	7.099	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	103.878	103.878
7Q10 Hardness (mg/L as CaCO3) =	103.907	103.907

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.598
(7.204 - pH)	-1.394
(pH - 7.204)	1.394
Trout Present Criterion (mg N/l	1.777
Trout Absent Criterion (mg N/L	2.659
Trout Present?	n
Effective Criterion (mg N/L)	2.659

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	28.082
90th Percentile pH (SU)	8.599
MIN	1.189
MAX	28.082
(7.688 - pH)	-0.911
(pH - 7.688)	0.911
Early LS Present Criterion (mg N	0.384
Early LS Absent Criterion (mg N/	0.384
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.384

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.599
(7.204 - pH)	-1.395
(pH - 7.204)	1.395
Trout Present Criterion (mg N/l	1.774
Trout Absent Criterion (mg N/L	2.655
Trout Present?	n
Effective Criterion (mg N/L)	2.655

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	25.027
90th Percentile pH (SU)	8.599
MIN	1.447
MAX	25.027
(7.688 - pH)	-0.911
(pH - 7.688)	0.911
Early LS Present Criterion (mg N	0.468
Early LS Absent Criterion (mg N/	0.468
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.468

Outfall 003

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: GP Big Island (Outfall 003) Permit No.: VA0003026

Receiving Stream: James River Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	99 mg/L	1Q10 (Annual) =	10 MGD	Annual - 1Q10 Mix =	100 %	Mean Hardness (as CaCO3) =	170 mg/L
90% Temperature (Annual) =	31.9 deg C	7Q10 (Annual) =	20 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	30 deg C
90% Temperature (Wet season) =	30.3 deg C	30Q10 (Annual) =	20 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	26 deg C
90% Maximum pH =	8.5 SU	1Q10 (Wet season) =	10 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	8.4 SU
10% Maximum pH =	7 SU	30Q10 (Wet season)	20 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	7.2 SU
Tier Designation (1 or 2) =	2	30Q5 =	20 MGD			Discharge Flow =	1 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	2.1E+04	--	--	na	9.9E+01	--	--	na	2.1E+03	--	--	na	2.1E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	2.0E+02	--	--	na	9.3E-01	--	--	na	2.0E+01	--	--	na	2.0E+01
Acrylonitrile^{C}	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	na	2.5E-01	--	--	na	2.5E-01	--	--	na	2.5E-01
Aldrin ^{C}	0	3.0E+00	--	na	5.0E-04	3.3E+01	--	na	5.0E-04	7.5E-01	--	na	5.0E-05	8.3E+00	--	na	5.0E-05	8.3E+00	--	na	5.0E-05
Ammonia-N (mg/l) (Yearly)	0.288	3.27E+00	3.60E-01	na	--	3.3E+01	1.8E+00	na	--	1.03E+00	3.06E-01	na	--	8.5E+00	6.7E-01	na	--	8.5E+00	6.7E-01	na	--
Ammonia-N (mg/l) (High Flow)	0.055	3.27E+00	4.03E-01	na	--	3.5E+01	7.4E+00	na	--	8.58E-01	1.42E-01	na	--	8.9E+00	1.9E+00	na	--	8.9E+00	1.9E+00	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	8.4E+05	--	--	na	4.0E+03	--	--	na	8.4E+04	--	--	na	8.4E+04
Antimony	0	--	--	na	6.4E+02	--	--	na	1.3E+04	--	--	na	6.4E+01	--	--	na	1.3E+03	--	--	na	1.3E+03
Arsenic	0	3.4E+02	1.5E+02	na	--	3.7E+03	3.2E+03	na	--	8.5E+01	3.8E+01	na	--	9.4E+02	7.9E+02	na	--	9.4E+02	7.9E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Benzene ^{C}	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	na	5.1E+01	--	--	na	5.1E+01	--	--	na	5.1E+01
Benzidine^{C}	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	na	2.0E-04	--	--	na	2.0E-04	--	--	na	2.0E-04
Benzo (a) anthracene ^{C}	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	1.8E-02
Benzo (b) fluoranthene ^{C}	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	1.8E-02
Benzo (k) fluoranthene ^{C}	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	1.8E-02
Benzo (a) pyrene ^{C}	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	1.8E-02
Bis2-Chloroethyl Ether ^{C}	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	na	5.3E-01	--	--	na	5.3E-01	--	--	na	5.3E-01
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.4E+06	--	--	na	6.5E+03	--	--	na	1.4E+05	--	--	na	1.4E+05
Bis 2-Ethylhexyl Phthalate ^{C}	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	na	2.2E+00	--	--	na	2.2E+00	--	--	na	2.2E+00
Bromoform ^{C}	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	na	1.4E+02
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	4.0E+04	--	--	na	1.9E+02	--	--	na	4.0E+03	--	--	na	4.0E+03
Cadmium	0	4.2E+00	1.2E+00	na	--	4.6E+01	2.4E+01	na	--	1.0E+00	2.9E-01	na	--	1.1E+01	6.1E+00	na	--	1.1E+01	6.1E+00	na	--
Carbon Tetrachloride ^{C}	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	na	1.6E+00	--	--	na	1.6E+00	--	--	na	1.6E+00
Chlordane ^{C}	0	2.4E+00	4.3E-03	na	8.1E-03	2.6E+01	9.0E-02	na	8.1E-03	6.0E-01	1.1E-03	na	8.1E-04	6.6E+00	2.3E-02	na	8.1E-04	6.6E+00	2.3E-02	na	8.1E-04
Chloride	0	8.6E+05	2.3E+05	na	--	9.5E+06	4.8E+06	na	--	2.2E+05	5.8E+04	na	--	2.4E+06	1.2E+06	na	--	2.4E+06	1.2E+06	na	--
TRC	0	1.9E+01	1.1E+01	na	--	2.1E+02	2.3E+02	na	--	4.8E+00	2.8E+00	na	--	5.2E+01	5.8E+01	na	--	5.2E+01	5.8E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	3.4E+04	--	--	na	1.6E+02	--	--	na	3.4E+03	--	--	na	3.4E+03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	na	1.3E+01	--	--	na	1.3E+01	--	--	na	**1.3E+01**
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.3E+05	--	--	na	1.1E+03	--	--	na	2.3E+04	--	--	na	**2.3E+04**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	3.4E+04	--	--	na	1.6E+02	--	--	na	3.4E+03	--	--	na	**3.4E+03**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	3.2E+03	--	--	na	1.5E+01	--	--	na	3.2E+02	--	--	na	**3.2E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	9.1E-01	8.6E-01	na	--	2.1E-02	1.0E-02	na	--	2.3E-01	2.2E-01	na	--	**2.3E-01**	**2.2E-01**	na	--
Chromium III	0	6.0E+02	7.6E+01	na	--	6.5E+03	1.6E+03	na	--	1.5E+02	1.9E+01	na	--	1.6E+03	4.0E+02	na	--	**1.6E+03**	**4.0E+02**	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.8E+02	2.3E+02	na	--	4.0E+00	2.8E+00	na	--	4.4E+01	5.8E+01	na	--	**4.4E+01**	**5.8E+01**	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	2.1E+02	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	1.8E-03	--	--	na	1.8E-03	--	--	na	**1.8E-03**
Copper	0	1.4E+01	9.1E+00	na	--	1.6E+02	1.9E+02	na	--	3.5E+00	2.3E+00	na	--	3.9E+01	4.8E+01	na	--	**3.9E+01**	**4.8E+01**	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.4E+02	1.1E+02	na	3.4E+05	5.5E+00	1.3E+00	na	1.6E+03	6.1E+01	2.7E+01	na	3.4E+04	**6.1E+01**	**2.7E+01**	na	**3.4E+04**
DDD[C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	na	3.1E-04	--	--	na	3.1E-04	--	--	na	**3.1E-04**
DDE[C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	na	2.2E-04	--	--	na	2.2E-04	--	--	na	**2.2E-04**
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.2E+01	2.1E-02	na	2.2E-03	2.8E-01	2.5E-04	na	2.2E-04	3.0E+00	5.3E-03	na	2.2E-04	**3.0E+00**	**5.3E-03**	na	**2.2E-04**
Demeton	0	--	1.0E-01	na	--	--	2.1E+00	na	--	--	2.5E-02	na	--	--	5.3E-01	na	--	--	**5.3E-01**	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.9E+00	3.6E+00	na	--	4.3E-02	4.3E-02	na	--	4.7E-01	8.9E-01	na	--	**4.7E-01**	**8.9E-01**	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	**1.8E-02**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.7E+04	--	--	na	1.3E+02	--	--	na	2.7E+03	--	--	na	**2.7E+03**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	2.0E+04	--	--	na	9.6E+01	--	--	na	2.0E+03	--	--	na	**2.0E+03**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	4.0E+03	--	--	na	1.9E+01	--	--	na	4.0E+02	--	--	na	**4.0E+02**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	na	2.8E-02	--	--	na	2.8E-02	--	--	na	**2.8E-02**
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	na	1.7E+01	--	--	na	1.7E+01	--	--	na	**1.7E+01**
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	na	3.7E+01	--	--	na	3.7E+01	--	--	na	**3.7E+01**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.5E+05	--	--	na	7.1E+02	--	--	na	1.5E+04	--	--	na	**1.5E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	2.1E+05	--	--	na	1.0E+03	--	--	na	2.1E+04	--	--	na	**2.1E+04**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	6.1E+03	--	--	na	2.9E+01	--	--	na	6.1E+02	--	--	na	**6.1E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	na	1.5E+01	--	--	na	1.5E+01	--	--	na	**1.5E+01**
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	na	2.1E+01	--	--	na	2.1E+01	--	--	na	**2.1E+01**
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.6E+00	1.2E+00	na	5.4E-04	6.0E-02	1.4E-02	na	5.4E-05	6.6E-01	2.9E-01	na	5.4E-05	**6.6E-01**	**2.9E-01**	na	**5.4E-05**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	9.2E+05	--	--	na	4.4E+03	--	--	na	9.2E+04	--	--	na	**9.2E+04**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.8E+04	--	--	na	8.5E+01	--	--	na	1.8E+03	--	--	na	**1.8E+03**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.3E+07	--	--	na	1.1E+05	--	--	na	2.3E+06	--	--	na	**2.3E+06**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	9.5E+04	--	--	na	4.5E+02	--	--	na	9.5E+03	--	--	na	**9.5E+03**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.1E+05	--	--	na	5.3E+02	--	--	na	1.1E+04	--	--	na	**1.1E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	5.9E+03	--	--	na	2.8E+01	--	--	na	5.9E+02	--	--	na	**5.9E+02**
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	na	3.4E+00	--	--	na	3.4E+00	--	--	na	**3.4E+00**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	1.1E-06	--	--	na	5.1E-09	--	--	na	1.1E-07	--	--	na	**1.1E-07**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	na	2.0E-01	--	--	na	2.0E-01	--	--	na	**2.0E-01**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.4E+00	1.2E+00	na	1.9E+03	5.5E-02	1.4E-02	na	8.9E+00	6.1E-01	2.9E-01	na	1.9E+02	**6.1E-01**	**2.9E-01**	na	**1.9E+02**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.4E+00	1.2E+00	na	1.9E+03	5.5E-02	1.4E-02	na	8.9E+00	6.1E-01	2.9E-01	na	1.9E+02	**6.1E-01**	**2.9E-01**	na	**1.9E+02**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.4E+00	1.2E+00	--	--	5.5E-02	1.4E-02	--	--	6.1E-01	2.9E-01	--	--	**6.1E-01**	**2.9E-01**	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.9E+03	--	--	na	8.9E+00	--	--	na	1.9E+02	--	--	na	**1.9E+02**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	9.5E-01	7.6E-01	na	1.3E+00	2.2E-02	9.0E-03	na	6.0E-03	2.4E-01	1.9E-01	na	1.3E-01	**2.4E-01**	**1.9E-01**	na	**1.3E-01**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	6.3E+00	--	--	na	3.0E-02	--	--	na	6.3E-01	--	--	na	**6.3E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	4.4E+04	--	--	na	2.1E+02	--	--	na	4.4E+03	--	--	na	**4.4E+03**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.9E+03	--	--	na	1.4E+01	--	--	na	2.9E+02	--	--	na	**2.9E+02**
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.1E+05	--	--	na	5.3E+02	--	--	na	1.1E+04	--	--	na	**1.1E+04**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	2.1E-01	na	--	--	2.5E-03	na	--	--	5.3E-02	na	--	--	**5.3E-02**	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	5.7E+00	8.0E-02	na	7.9E-04	1.3E-01	9.5E-04	na	7.9E-05	1.4E+00	2.0E-02	na	7.9E-05	**1.4E+00**	**2.0E-02**	na	**7.9E-05**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	5.7E+00	8.0E-02	na	3.9E-04	1.3E-01	9.5E-04	na	3.9E-05	1.4E+00	2.0E-02	na	3.9E-05	**1.4E+00**	**2.0E-02**	na	**3.9E-05**
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	na	2.9E-04	--	--	na	2.9E-04	--	--	na	**2.9E-04**
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	na	1.8E+01	--	--	na	1.8E+01	--	--	na	**1.8E+01**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	na	4.9E-03	--	--	na	4.9E-03	--	--	na	**4.9E-03**
Hexachlorocyclohexane Beta BHC[C]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	na	1.7E-02	--	--	na	1.7E-02	--	--	na	**1.7E-02**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.0E+01	--	na	1.8E+00	2.4E-01	--	na	1.8E-01	2.6E+00	--	na	1.8E-01	**2.6E+00**	--	na	**1.8E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.3E+04	--	--	na	1.1E+02	--	--	na	2.3E+03	--	--	na	**2.3E+03**
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	na	3.3E+00	--	--	na	3.3E+00	--	--	na	**3.3E+00**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	4.2E+01	na	--	--	5.0E-01	na	--	--	1.1E+01	na	--	--	**1.1E+01**	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	**1.8E-02**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	na	9.6E+02	--	--	na	9.6E+02	--	--	na	**9.6E+02**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Lead	0	1.3E+02	1.4E+01	na	--	1.4E+03	2.9E+02	na	--	3.2E+01	3.5E+00	na	--	3.5E+02	7.3E+01	na	--	**3.5E+02**	**7.3E+01**	na	--
Malathion	0	--	1.0E-01	na	--	--	2.1E+00	na	--	--	2.5E-02	na	--	--	5.3E-01	na	--	--	**5.3E-01**	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.5E+01	1.6E+01	--	--	3.5E-01	1.9E-01	--	--	3.9E+00	4.0E+00	--	--	**3.9E+00**	**4.0E+00**	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	3.2E+04	--	--	na	1.5E+02	--	--	na	3.2E+03	--	--	na	**3.2E+03**
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	na	5.9E+02	--	--	na	5.9E+02	--	--	na	**5.9E+02**
Methoxychlor	0	--	3.0E-02	na	--	--	6.3E-01	na	--	--	7.5E-03	na	--	--	1.6E-01	na	--	--	**1.6E-01**	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Nickel	0	1.9E+02	2.1E+01	na	4.6E+03	2.1E+03	4.3E+02	na	9.7E+04	4.8E+01	5.2E+00	na	4.6E+02	5.2E+02	1.1E+02	na	9.7E+03	**5.2E+02**	**1.1E+02**	na	**9.7E+03**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.4E+04	--	--	na	6.9E+01	--	--	na	1.4E+03	--	--	na	**1.4E+03**
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	na	3.0E+00	--	--	na	3.0E+00	--	--	na	**3.0E+00**
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	na	6.0E+00	--	--	na	6.0E+00	--	--	na	**6.0E+00**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	na	5.1E-01	--	--	na	5.1E-01	--	--	na	**5.1E-01**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	3.1E+02	1.4E+02	na	--	7.0E+00	1.7E+00	--	--	7.7E+01	3.5E+01	--	--	**7.7E+01**	**3.5E+01**	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	7.2E-01	2.7E-01	na	--	1.6E-02	3.3E-03	na	--	1.8E-01	6.8E-02	na	--	**1.8E-01**	**6.8E-02**	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	2.9E-01	na	6.4E-04	--	3.5E-03	na	6.4E-05	--	7.4E-02	na	6.4E-05	--	**7.4E-02**	na	**6.4E-05**
Pentachlorophenol [C]	0	8.9E+00	6.7E+00	na	3.0E+01	9.7E+01	1.4E+02	na	3.0E+01	2.2E+00	1.7E+00	na	3.0E+00	2.4E+01	3.5E+01	na	3.0E+00	**2.4E+01**	**3.5E+01**	na	**3.0E+00**
Phenol	0	--	--	na	8.6E+05	--	--	na	1.8E+07	--	--	na	8.6E+04	--	--	na	1.8E+06	--	--	na	**1.8E+06**
Pyrene	0	--	--	na	4.0E+03	--	--	na	8.4E+04	--	--	na	4.0E+02	--	--	na	8.4E+03	--	--	na	**8.4E+03**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	8.4E+01	--	--	na	4.0E-01	--	--	na	8.4E+00	--	--	na	**8.4E+00**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.2E+02	1.1E+02	na	8.8E+04	5.0E+00	1.3E+00	na	4.2E+02	5.5E+01	2.6E+01	na	8.8E+03	**5.5E+01**	**2.6E+01**	**na**	**8.8E+03**
Silver	0	3.8E+00	--	na	--	4.2E+01	--	na	--	9.4E-01	--	na	--	1.0E+01	--	na	--	**1.0E+01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane ^{C}	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	na	4.0E+00	--	--	na	4.0E+00	**--**	**--**	**na**	**4.0E+00**
Tetrachloroethylene ^{C}	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	na	3.3E+00	--	--	na	3.3E+00	**--**	**--**	**na**	**3.3E+00**
Thallium	0	--	--	na	4.7E-01	--	--	na	9.9E+00	--	--	na	4.7E-02	--	--	na	9.9E-01	**--**	**--**	**na**	**9.9E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.3E+05	--	--	na	6.0E+02	--	--	na	1.3E+04	**--**	**--**	**na**	**1.3E+04**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene ^{C}	0	7.3E-01	2.0E-04	na	2.8E-03	8.0E+00	4.2E-03	na	2.8E-03	1.8E-01	5.0E-05	na	2.8E-04	2.0E+00	1.1E-03	na	2.8E-04	**2.0E+00**	**1.1E-03**	**na**	**2.8E-04**
Tributyltin	0	4.6E-01	7.2E-02	na	--	5.1E+00	1.5E+00	na	--	1.2E-01	1.8E-02	na	--	1.3E+00	3.8E-01	na	--	**1.3E+00**	**3.8E-01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.5E+03	--	--	na	7.0E+00	--	--	na	1.5E+02	**--**	**--**	**na**	**1.5E+02**
1,1,2-Trichloroethane ^{C}	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	na	1.6E+01	--	--	na	1.6E+01	**--**	**--**	**na**	**1.6E+01**
Trichloroethylene ^{C}	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	na	3.0E+01	--	--	na	3.0E+01	**--**	**--**	**na**	**3.0E+01**
2,4,6-Trichlorophenol ^{C}	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	na	2.4E+00	--	--	na	2.4E+00	**--**	**--**	**na**	**2.4E+00**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride ^{C}	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	na	2.4E+00	--	--	na	2.4E+00	**--**	**--**	**na**	**2.4E+00**
Zinc	0	1.2E+02	1.2E+02	na	2.6E+04	1.3E+03	2.5E+03	na	5.5E+05	3.1E+01	3.0E+01	na	2.6E+03	3.4E+02	6.3E+02	na	5.5E+04	**3.4E+02**	**6.3E+02**	**na**	**5.5E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.3E+03
Arsenic	3.7E+02
Barium	na
Cadmium	3.6E+00
Chromium III	2.4E+02
Chromium VI	1.6E+01
Copper	1.6E+01
Iron	na
Lead	4.4E+01
Manganese	na
Mercury	1.5E+00
Nickel	6.5E+01
Selenium	1.6E+01
Silver	4.2E+00
Zinc	1.3E+02

Note: do not use QL's lower than the minimum QL's provided in agency guidance

1.000 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD 1.000

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	10.000	10.000	11.000	11.000
7Q10	20.000	N/A	21.000	N/A
30Q10	20.000	20.000	21.000	21.000
30Q5	20.000	N/A	21.000	N/A
Harm. Mean	0.000	N/A	1.000	N/A
Annual Avg.	0.000	N/A	1.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	31.727	29.909
30Q10 90th% Temp. Mix (deg C)	31.810	30.095
1Q10 90th% pH Mix (SU)	8.490	8.490
30Q10 90th% pH Mix (SU)	8.495	8.495
1Q10 10th% pH Mix (SU)	7.015	N/A
7Q10 10th% pH Mix (SU)	7.008	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	105.5	105.5
7Q10 Hardness (mg/L as CaCO3)	102.4	102.4

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.490
(7.204 - pH)	-1.286
(pH - 7.204)	1.286
Trout Present Criterion (mg N/l	2.181
Trout Absent Criterion (mg N/L	3.265
Trout Present?	n
Effective Criterion (mg N/L)	3.265

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	31.810
90th Percentile pH (SU)	8.495
MIN	0.935
MAX	31.810
(7.688 - pH)	-0.807
(pH - 7.688)	0.807
Early LS Present Criterion (mg N	0.360
Early LS Absent Criterion (mg N/	0.360
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.360

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.490
(7.204 - pH)	-1.286
(pH - 7.204)	1.286
Trout Present Criterion (mg N/l	2.181
Trout Absent Criterion (mg N/L	3.265
Trout Present?	n
Effective Criterion (mg N/L)	3.265

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	30.095
90th Percentile pH (SU)	8.495
MIN	1.044
MAX	30.095
(7.688 - pH)	-0.807
(pH - 7.688)	0.807
Early LS Present Criterion (mg N	0.403
Early LS Absent Criterion (mg N/	0.403
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.403

1.000 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD 1.000

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	10.000	10.000	11.000	11.000
7Q10	20.000	N/A	21.000	N/A
30Q10	20.000	20.000	21.000	21.000
30Q5	20.000	N/A	21.000	N/A
Harm. Mean	0.000	N/A	1.000	N/A
Annual Avg.	0.000	N/A	1.000	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	31.727	29.909
30Q10 90th% Temp. Mix (deg C)	31.810	30.095
1Q10 90th% pH Mix (SU)	8.490	8.490
30Q10 90th% pH Mix (SU)	8.495	8.495
1Q10 10th% pH Mix (SU)	7.015	N/A
7Q10 10th% pH Mix (SU)	7.008	N/A

	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	105.455	105.455
7Q10 Hardness (mg/L as CaCO3) =	102.381	102.381

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.490
(7.204 - pH)	-1.286
(pH - 7.204)	1.286
Trout Present Criterion (mg N/l	2.181
Trout Absent Criterion (mg N/L	3.265
Trout Present?	n
Effective Criterion (mg N/L)	3.265

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	31.810
90th Percentile pH (SU)	8.495
MIN	0.935
MAX	31.810
(7.688 - pH)	-0.807
(pH - 7.688)	0.807
Early LS Present Criterion (mg N	0.360
Early LS Absent Criterion (mg N/	0.360
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.360

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.490
(7.204 - pH)	-1.286
(pH - 7.204)	1.286
Trout Present Criterion (mg N/l	2.181
Trout Absent Criterion (mg N/L	3.265
Trout Present?	n
Effective Criterion (mg N/L)	3.265

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	30.095
90th Percentile pH (SU)	8.495
MIN	1.044
MAX	30.095
(7.688 - pH)	-0.807
(pH - 7.688)	0.807
Early LS Present Criterion (mg N	0.403
Early LS Absent Criterion (mg N/	0.403
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.403

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Facility = GP Big Island (Outfall 003)
Chemical = ammonia (mg/L)
Chronic averaging period = 30
WLAa = 8.5
WLAc = 1.9
Q.L. = 0.2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 14
Expected Value = .599554
Variance = .181687
C.V. = 0.710940
97th percentile daily values = 1.68665
97th percentile 4 day average = 1.08075
97th percentile 30 day average= .745937
< Q.L. = 2
Model used = delta lognormal

No Limit is required for this material

The data are:

1.57
1.66
0.44
0.39
0.37
0.6
0.18
0.38
0.5
0.6
0.86
0.42
0.14
0.24

Subpart J—Secondary Fiber Non-Deink Subcategory

§ 430.100 Applicability; description of the secondary fiber non-deink subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of: Paperboard from wastepaper; tissue paper from wastepaper without deinking at secondary fiber mills; molded products from wastepaper without deinking at secondary fiber mills; and builders' paper and roofing felt from wastepaper.

§ 430.101 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 and § 430.01 of this part shall apply to this subpart.

(b) Noncorrugating medium furnish subdivision mills are mills where recycled corrugating medium is not used in the production of paperboard.

(c) Corrugating medium furnish subdivision mills are mills where only recycled corrugating medium is used in the production of paperboard.

§ 430.102 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where paperboard from wastepaper is produced—noncorrugating medium finish subdivision]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
BOD5	3.0	1.5
TSS	5.0	2.5
pH	([1])	([1])

[1] 1Within the range of 6.0 to 9.0 at all times.

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where paperboard from wastepaper is produced—corrugating medium finish subdivision]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
BOD5	5.7	2.8
TSS	9.2	4.6
pH	([1])	([1])

[1] Within the range of 6.0 to 9.0 at all times.

J

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
BOD5	5.0	3.0
TSS	5.0	3.0
pH	(1)	(1)
Setteable Solids	(2)	(2)

[1] Within the range of 6.0 to 9.0 at all times.
[2] Not to exceed 0.2 ml/l.

(b) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days limitations but shall be subject to annual average effluent limitations:

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average days)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	13.7	7.1	4.0
TSS	17.05	9.2	5.1
pH	(1)	(1)	(1)

[1] Within the range of 5.0 to 9.0 at all times.

SUBPART J

[BPT effluent limitations for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average days)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	4.4	2.3	1.3
TSS	10.8	5.8	3.2
pH	(1)	(1)	(1)

[1] Within the range of 5.0 to 9.0 at all times.

§ 430.103 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in 40 CFR 401.16) in § 430.102 of this subpart for the best practicable control technology currently available (BPT).

(b) For secondary fiber non-deink facilities where paperboard from wastepaper is produced, non-continuous dischargers shall not be subject to the maximum day and average-of-30-consecutive-days limitations, but shall be subject to annual average effluent limitations determined by dividing the average-of-30-consecutive-days limitations for BOD5 and TSS by 1.77 and 2.18.

(c) For secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced, non-continuous dischargers shall not be subject to the maximum day and average-of-30-consecutive-days limitations, but shall be subject to annual average effluent limitations determined by dividing the average-of-30-consecutive-days limitations for BOD5 and TSS by 1.90 and 1.90.

§ 430.104 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart where chlorophenolic-containing biocides are used must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). Non-continuous dischargers shall not be subject to the maximum day mass limitations in kg/kkg (lb/1000 lb) but shall be subject to concentration limitations. Concentration limitations are only applicable to non-continuous dischargers. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

SUBPART J

[BAT effluent limitations for secondary fiber non-deink facilities where paperboard from wastepaper is produced]

Pollutant or pollutant property	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.00087	(0.029)(7.2)/y
Trichlorophenol	0.00030	(0.010)(7.2)/y
y = wastewater discharged in kgal per ton of product.		

SUBPART J

[BAT effluent limitations for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

Pollutant or pollutant property	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.0017	(0.029)(14.4)/y
Trichlorophenol	0.00060	(0.010)(14.4)/y
y = wastewater discharged in kgal per ton of product.		

SUBPART J

[BAT effluent limitations for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

Pollutant or pollutant property	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.0030	(0.029)(25.2)/y
Trichlorophenol	0.0011	(0.010)(25.2)/y

y = wastewater discharged in kgal per ton of product.

SUBPART J

[BAT effluent limitations for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

Pollutant or pollutant property	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.0026	(0.029)(21.1)/y
Trichlorophenol	0.00088	(0.010)(21.1)/y

y = wastewater discharged in kgal per ton of product.

§430.105 New source performance standards (NSPS).

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days effluent limitations for BOD5 and TSS, but shall be subject to annual average effluent limitations. Also, for non-continuous dischargers, concentration limitations (mg/l) shall apply, where provided. Concentration limitations will only apply to non-continuous dischargers. Only facilities where chlorophenolic-containing biocides are used shall be subject to pentachlorophenol and trichlorophenol limitations. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

SUBPART J

[NSPS for secondary fiber non-deink facilities where paperboard from wastepaper is produced—noncorrugating medium furnish subdivision]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	2.6	1.4	0.73
TSS	3.5	1.8	0.95
pH	(1)	(1)	(1)

	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.00087	(0.065)(3.2)/y
Trichlorophenol	0.00030	(0.023)(3.2)/y

	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
y = wastewater discharged in kgal per ton at all times.		

[1] Within the range of 5.0 to 9.0 at all times.

SUBPART J

[NSPS for secondary fiber non-deink facilities where paperboard from wastepaper is produced—corrugating medium finish subdivision]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	3.9	2.1	1.1
TSS	4.4	2.3	1.2
pH	(1)	(1)	(1)

	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.00087	(0.065)(3.2)/y
Trichlorophenol	0.00030	(0.023)(3.2)/y
y = wastewater discharged in kgal per ton at all times.		

[1] Within the range of 5.0 to 9.0 at all times.

SUBPART J

[NSPS for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	1.7	0.94	0.49
TSS	2.7	1.40	0.74
pH	(1)	(1)	(1)

	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.0017	(0.155)(2.7)/y
Trichlorophenol	0.00060	(0.053)(2.7)/y
y = wastewater discharged in kgal per ton at all times.		

[1] Within the range of 5.0 to 9.0 at all times.

J

SUBPART J

[NSPS for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	4.6	2.5	1.3
TSS	10.2	5.3	2.8
pH	(1)	(1)	(1)

	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.0030	(0.045)(16.3)/y
Trichlorophenol	0.0011	(0.015)(16.3)/y
y = wastewater discharged in kgal per ton at all times.		

[1] Within the range of 5.0 to 9.0 at all times.

SUBPART J

[NSPS for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	2.1	1.1	0.58
TSS	4.4	2.3	1.21
pH	(1)	(1)	(1)

	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.0026	(0.107)(5.7)/y
Trichlorophenol	0.00088	(0.037)(5.7)/y
y = wastewater discharged in kgal per ton at all times.		

[1] Within the range of 5.0 to 9.0 at all times.

§430.106 Pretreatment standards for existing sources (PSES).

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must: Comply with 40 CFR part 403; and achieve the following pretreatment standards for existing sources (PSES) if it uses chlorophenolic-containing biocides. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides. PSES must be attained on or before July 1, 1984:

SUBPART J

[PSES for secondary fiber non-deink facilities where paperboard from wastepaper is produced]

Pollutant or pollutant property	Maximum for any 1 day	
	Milligrams/liter (mg/l)	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.032)(7.2)/y	0.00096
Trichlorophenol	(0.010)(7.2)/y	0.00030
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSES for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

Pollutant or pollutant property	Maximum for any 1 day	
	Milligrams/liter (mg/l)	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.032)(14.4)y	0.0019
Trichlorophenol	(0.010)(14.4)y	0.00060
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSES for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

Pollutant or pollutant property	Maximum for any 1 day	
	Milligrams/liter (mg/l)	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.032)(25.2)y	0.0034
Trichlorophenol	(0.010)(25.2)/y	0.0011
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSES for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

Pollutant or pollutant property	Maximum for any 1 day	
	Milligrams/liter (mg/l)	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.032)(21.1)y	0.0028
Trichlorophenol	(0.010)(21.1)y	0.00088
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

§ 430.107 Pretreatment standards for new sources (PSNS).

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must: Comply with 40 CFR part 403; and achieve the following pretreatment standards for new sources (PSNS) if it uses chlorophenolic-containing biocides. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

SUBPART J

[PSNS for secondary fiber non-deink facilities where paperboard from wastepaper is produced]

Pollutant or pollutant property	Maximum for any 1 day	
	Milligrams/liter (mg/l)	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.072)(3.2)/y	0.00096
Trichlorophenol	(0.023)(3.2)/y	0.00030
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSNS for secondary fiber non-deink facilities where builders' paper and roofing felt from wastepaper are produced]

Pollutant or pollutant property	Maximum for any 1 day	
	Milligrams/liter (mg/l)	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.171)(2.7)/y	0.0019
Trichlorophenol	(0.053)(2.7)/y	0.00060
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSNS for secondary fiber non-deink facilities where tissue from wastepaper is produced without deinking]

Pollutant or pollutant property	Maximum for any 1 day	
	Milligrams/liter (mg/l)	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.049)(16.3)/y	0.0034
Trichlorophenol	(0.015)(16.3)/y	0.0011
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

SUBPART J

[PSNS for secondary fiber non-deink facilities where molded products from wastepaper are produced without deinking]

Pollutant or pollutant property	Maximum for any 1 day	
	Milligrams/liter (mg/l)	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.118)(5.7)/y	0.0028
Trichlorophenol	(0.037)(5.7)/y	0.00088
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass effluent limitations.

J

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
TSS	0.50	0.25
Total phosphorus (as P)	.80	.40
Fluoride (as F)	.30	.15
pH	(1)	(1)

[1] Within the range 6.0 to 9.5.

§ 422.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
Total phosphorus (as P)	0.56	0.28
Fluoride (as F)	.21	.11

[44 FR 50744, Aug. 29, 1979]

§ 422.64 [Reserved]

§ 422.65 Standards of performance for new sources.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the standards of performance for new sources:

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
TSS	0.35	0.18
Total phosphorus (as P)	.56	.28
Fluoride (as F)	.21	.11
pH	(1)	(1)

[1] Within the range 6.0 to 9.5.

§ 422.66 [Reserved]

§ 422.67 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology.

Except as provided in §§ 125.30 through 125.32, the following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best conventional pollutant control technology:

[Metric units (kg/kkg of product); English units (lb/1,000 lb of product)]

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
TSS	0.35	0.18
pH	(1)	(1)

[1] Within the range 6.0 to 9.5.

[51 FR 25000, July 9, 1986]

PART 423—STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

Sec.

423

AUTHORITY: Secs. 301; 304(b), (c), (e), and (g); 306(b) and (c); 307(b) and (c); and 501, Clean Water Act (Federal Water Pollution Control Act Amendments of 1972, as amended by Clean Water Act of 1977) (the "Act"; 33 U.S.C. 1311; 1314(b), (c), (e), and (g); 1316(b) and (c); 1317(b) and (c); and 1361; 86 Stat. 816, Pub. L. 92-500; 91 Stat. 1567, Pub. L. 95-217), unless otherwise noted.

SOURCE: 47 FR 52304, Nov. 19, 1982, unless otherwise noted.

§ 423.10 Applicability.

The provisions of this part are applicable to discharges resulting from the operation of a generating unit by an establishment primarily engaged in the generation of electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium.

§ 423.11 Specialized definitions.

In addition to the definitions set forth in 40 CFR part 401, the following definitions apply to this part:

(a) The term *total residual chlorine* (or total residual oxidants for intake water with bromides) means the value obtained using the amperometric method for total residual chlorine described in 40 CFR part 136.

(b) The term *low volume waste sources* means, taken collectively as if from one source, wastewater from all sources except those for which specific limitations are otherwise established in this part. Low volume wastes sources include, but are not limited to: wastewaters from wet scrubber air pollution control systems, ion exchange water treatment system, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, and recirculating house service water systems. Sanitary and air conditioning wastes are not included.

(c) The term *chemical metal cleaning waste* means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds, including, but not limited to, boiler tube cleaning.

(d) The term *metal cleaning waste* means any wastewater resulting from cleaning [with or without chemical cleaning compounds] any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning.

(e) The term *fly ash* means the ash that is carried out of the furnace by the gas stream and collected by mechanical precipitators, electrostatic precipitators, and/or fabric filters. Economizer ash is included when it is collected with fly ash.

(f) The term *bottom ash* means the ash that drops out of the furnace gas stream in the furnace and in the economizer sections. Economizer ash is included when it is collected with bottom ash.

(g) The term *once through cooling water* means water passed through the main cooling condensers in one or two passes for the purpose of removing waste heat.

(h) The term *recirculated cooling water* means water which is passed through the main condensers for the purpose of removing waste heat, passed through a cooling device for the purpose of removing such heat from the water and then passed again, except for blowdown, through the main condenser.

(i) The term *10 year, 24/hour rainfall event* means a rainfall event with a probable recurrence interval of once in ten years as defined by the National Weather Service in Technical Paper No. 40. *Rainfall Frequency Atlas of the United States*, May 1961 or equivalent regional rainfall probability information developed therefrom.

(j) The term *blowdown* means the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practices.

(k) The term *average concentration* as it relates to chlorine discharge means the average of analyses made over a single period of chlorine release which does not exceed two hours.

(l) The term *free available chlorine* shall mean the value obtained using the amperometric titration method for free available chlorine described in *Standard Methods for the Examination of Water and Wastewater*, page 112 (13th edition).

(m) The term *coal pile runoff* means the rainfall runoff from or through any coal storage pile.

§ 423.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

(a) In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, utilization of facilities, raw materials, manufacturing processes, non-water quality environmental impacts, control and treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES Permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The phrase "other such factors" appearing above may include significant cost differentials. In no event may a discharger's impact on receiving water quality be considered as a factor under this paragraph.

(b) Any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction by the application of the best practicable control technology currently available (BPT):

(1) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(2) There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

(3) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration lised in the following table:

Pollutant or pollutant property	BPT effluent limitations	
	Maximum for any 1 day (mg/l)	Average of daily values for 30 consecutive days shall not exceed (mg/l)
TSS	100.0	30.0
Oil and grease	20.0	15.0

(4) The quantity of pollutants discharged in fly ash and bottom ash transport water shall not exceed the quantity determined by multiplying the flow of fly ash and bottom ash transport water times the concentration listed in the following table:

Pollutant or pollutant property	BPT effluent limitations	
	Maximum for any 1 day (mg/l)	Average of daily values for 30 consecutive days shall not exceed (mg/l)
TSS	100.0	30.0
Oil and grease	20.0	15.0

(5) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Pollutant or pollutant property	BPT effluent limitations	
	Maximum for any 1 day (mg/l)	Average of daily values for 30 consecutive days shall not exceed (mg/l)
TSS	100.0	30.0
Oil and grease	20.0	15.0
Copper, total	1.0	1.0
Iron, total	1.0	1.0

(6) The quantity of pollutants discharged in once through cooling water shall not exceed the quantity determined by multiplying the flow of once through cooling water sources times the concentation listed in the following table:

Pollutant or pollutant property	BPT effluent limitations	
	Maximum concentration (mg/l)	Average concentration (mg/l)
Free available chlorine	0.5	0.2

(7) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown sources times the concentration listed in the following table:

Pollutant or pollutant property	BPT effluent limitations	
	Maximum concentration (mg/l)	Average concentration (mg/l)
Free available chlorine	0.5	0.2

(8) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level or chlorination.

(9) Subject to the provisions of paragraph (b)(10) of this section, the following effluent limitations shall apply to the point source discharges of coal pile runoff:

Pollutant or pollutant property	BPT effluent limitations
	Maximum concentration for any time (mg/l)
TSS	50

(10) Any untreated overflow from facilities designed, constructed, and operated to treat the volume of coal pile runoff which is associated with a 10 year, 24 hour rainfall event shall not be subject to the limitations in paragraph (b)(9) of this section.

(11) At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as a concentration limitation instead of the mass based limitations specified in paragraphs (b)(3) through (7) of this section. Concentration limitations shall be those concentrations specified in this section.

(12) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (b)(1) through (11) of this section attributable to each controlled waste source shall not exceed the specified limitations for that waste source.

(The information collection requirements contained in paragraph (a) were approved by the Office of Management and Budget under control number 2000–0194)

[47 FR 52304, Nov. 19, 1982, as amended at 48 FR 31404, July 8, 1983]

§ 423.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point

(c) An indirect discharger must demonstrate compliance with the pretreatment standards in paragraphs (a)(2) or (a)(3) of this section, as applicable, by monitoring for all pollutants at the point where the wastewater containing those pollutants leaves the bleach plant.

[63 FR 18635, Apr. 15, 1998; 63 FR 42240, Aug. 7, 1998]

§ 430.58 Best management practices (BMPs).

The definitions and requirements set forth in 40 CFR 430.03 apply to facilities in this subpart.

Subpart F—Semi-Chemical Subcategory

§ 430.60 Applicability; description of the semi-chemical subcategory.

The provisions of this subpart are applicable to discharges resulting from the integrated production of pulp and paper at semi-chemical mills.

§ 430.61 Specialized definitions.

For the purpose of this subpart, the general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 and § 430.01 of this part shall apply to this subpart.

§ 430.62 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

SUBPART F

[BPT effluent limitations for ammonia base mills]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
BOD5	8.0	4.0
TSS	10.0	5.0
pH	(1)	(1)

[1] Within the range of 6.0 to 9.0 at all times.

SUBPART F

[BPT effluent limitations for sodium base mills]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
BOD5	8.7	4.35
TSS	11.0	5.5
pH	(1)	(1)

[1] Within the range of 6.0 to 9.0 at all times.

F

§ 430.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT): The limitations shall be the same as those specified for conventional pollutants (which are defined in 40 CFR 401.16) in § 430.62 of this subpart for the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and average-of-30-consecutive-days limitations, but shall be subject to annual average effluent limitations determined by dividing the average-of-30-consecutive-days limitations for BOD5 by 1.36 and TSS by 1.36.

§ 430.64 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart where chlorophenolic-containing biocides are used must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). Non-continuous dischargers shall not be subject to the maximum day mass limitations in kg/kkg (lb/1,000 lb), but shall be subject to concentration limitations. Concentration limitations are only applicable to non-continuous dischargers. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

SUBPART F

Pollutant or pollutant property	BAT effluent limitations	
	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.0012	(0.029)(10.3)/y
Trichlorophenol	0.00043	(0.010)(10.3)/y
y = wastewater discharged in kgal per ton of product.		

§ 430.65 New source performance standards (NSPS).

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days effluent limitations for BOD5 and TSS, but shall be subject to annual average effluent limitations. Also, for non-continuous dischargers, concentration limitations (mg/l) shall apply, where provided. Concentration limitations will only apply to non-continuous dischargers. Only facilities where chlorophenolic-containing biocides are used shall be subject to pentachlorophenol and trichlorophenol limitations. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

F

SUBPART F

[NSPS]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	3.0	1.6	0.84
TSS	5.8	3.0	1.6
pH	(1)	(1)	(1)

	Maximum for any 1 day	
	Kg/kkg (or pounds per 1,000 lb) of product	Milligrams/liter
Pentachlorophenol	0.0012	(0.041)(7.3)/y
Trichlorophenol	0.00043	(0.014)(7.3)/y
y = wastewater discharged in kgal per ton at all times.		

[1] Within the range of 5.0 to 9.0 at all times.

§430.66 Pretreatment standards for existing sources (PSES).

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must: comply with 40 CFR part 403; and achieve the following pretreatment standards for existing sources (PSES) if it uses chlorophenolic-containing biocides. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides. PSES must be attained on or before July 1, 1984:

SUBPART F

Pollutant or pollutant property	PSES	
	Maximum for any 1 day	
	Milligrams/liter	Kg/kkg (or pounds per 1,000 lb) of product [a]
Pentachlorophenol	(0.032)(10.3)/y	0.0014
Trichlorophenol	(0.010)(10.3)/y	0.00043
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass equivalent limitations.

§430.67 Pretreatment standards for new sources (PSNS).

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must: comply with 40 CFR part 403; and achieve the following pretreatment standards for new sources (PSNS) if it uses chlorophenolic-containing biocides. Permittees not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides:

F

SUBPART F

Pollutant or pollutant property	PSNS	
	Maximum for any 1 day	
	Milligrams/liter	Kg/kkg (or pounds per 1,000 lb) of product[a]
Pentachlorophenol	(0.045)(7.3)/y	0.0014
Trichlorophenol	(0.014)(7.3)/y	0.00043
y = wastewater discharged in kgal per ton of product.		

[a] The following equivalent mass limitations are provided as guidance in cases when POTWs find it necessary to impose mass equivalent limitations.

Subpart G—Mechanical Pulp Subcategory

§ 430.70 Applicability; description of the mechanical pulp subcategory.

The provisions of this subpart are applicable to discharges resulting from: the production of pulp and paper at groundwood chemi-mechanical mills; the production of pulp and paper at groundwood mills through the application of the thermo-mechanical process; the integrated production of pulp and coarse paper, molded pulp products, and newsprint at groundwood mills; and the integrated production of pulp and fine paper at groundwood mills.

§ 430.71 Specialized definitions.

For the purpose of this subpart, the general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 and § 430.01 of this part shall apply to this subpart.

§ 430.72 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).

(a) Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and average of 30 consecutive days limitations but shall be subject to annual average effluent limitations:

SUBPART G

[BPT effluent limitations for mechanical pulp facilities where pulp and paper at groundwood chemi-mechanical mills are produced]

Pollutant or pollutant property	Kg/kkg (or pounds per 1,000 lb) of product		
	Continuous dischargers		Non-continuous dischargers (annual average)
	Maximum for any 1 day	Average of daily values for 30 consecutive days	
BOD5	13.5	7.05	3.96
TSS	19.75	10.65	5.85
pH	(1)	(1)	(1)

[1] Within the range of 5.0 to 9.0 at all times.

F

Attachment K

Toxicity Testing

- **Toxicity Testing Limit Justification Memorandum**

<u>Outfall 003</u>

- **Acute Chronic Toxicity Endpoint Spreadsheet (WETLIM10)**
- **STATS Program Output**

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Blue Ridge Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: WET Testing Limit Justification for GP Big Island, LLC
VPDES Permit No. VA0003026

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior BLF

DATE: March 8, 2010

INTRODUCTION:

GP Big Island, LLC operates a pulp and paper mill in Big Island, Virginia which produces corrugated paper medium via a semi-chemical process and linerboard from recycled corrugated cardboard. Table 1 summarizes the facility information. The permit for this facility was reissued on June 29, 2005, and included whole effluent toxicity testing requirements for outfalls 002 and 003 which are summarized in Table 1.

TOXICITY EVALUATION / DISCUSSION:

Tables 2 through 3 include a compilation of the chronic toxicity testing data since August 2005. Outfall 001 consists of noncontact cooling water. Testing was required for the 2000 permit reissuance because the facility is a primary industrial facility identified in Appendix A of Guidance Memo 00-2012. Acute toxicity testing was conducted from 2000 to 2005 and all the LC_{50} values were >100 percent. Toxicity testing was discontinued because the flow is a small percentage of the instream flow (0.036%) and toxicity was not observed in any of the samples. The water quality data from the current application do not indicate the presence of toxic chemicals above quantification levels. No further toxicity testing will be required for outfall 001.

For outfall 002, the facility has completed five valid chronic toxicity testing events. The facility passed all of the chronic toxicity tests with a TU_c of 1.0 for each test. The discharge consists of noncontact cooling water. Testing was required for outfall 002 because the facility is a primary industrial facility identified in Appendix A of Guidance Memo 00-2012. However, this discharge is only 1 percent of the flow and data do not show any toxicity. Since the 2005 reissuance neither chlorine nor bromine have been added the water. The water quality monitoring data from the current application do not indicate the presence of toxic chemicals above quantification levels. So, toxicity testing will no longer be required for this outfall.

Revised flow data for outfall 003 were input into the WETLIM10 spreadsheet to calculate a wasteload allocation and determine if the limit is sufficiently stringent. Using revised effluent and stream data, the WETLIM10 spreadsheet was revised to calculate a wasteload allocation. The wasteload allocations and a value to force a limit were entered into the STATS program to determine if the current limit is stringent enough. The calculated limit from the STATS program was converted to NOEC 100/TU_c), and then rounded up to the nearest whole numbers. The TU_c was back calculated from the rounded NOEC (100/NOEC). This resulting value of 25.0 TU_c is the same as the previous limit. Therefore, the limit has been carried forward from the previous permit.

Guidance Memorandum 00-2012 designates criteria to allow testing of only one species per test type rather than two species. The criteria designate one of two conditions that need to be met: (1) the average percent survival in 100% effluent for all the acceptable acute tests during a permit term with a particular species is $\geq$ 100, or (2) the average percent survival in 100% effluent for all of the acceptable chronic tests during a permit term with a particular species is $\geq$ 80% and the secondary endpoint for reproduction or growth is an NOEC=100%. If the criteria indicate that there is no possibility for toxicity from tests with the evaluated species, annual testing with the other tested species should be sufficient. Based upon these test results for outfall 003, the criteria found in Guidance 00-2012 are not met. So, chronic toxicity testing will be required using both *Ceriodaphnia dubia* and *Pimephales promelas*.

The previous permit required a frequency of once per quarter for outfall 003. For the 2000 permit reissuance there were three data points higher than the wasteload allocation. Due to these three points, a limit was needed. Since the limit became effective none of the data have exceeded 5.0 TU_c which is significantly lower than 25.0 TU_c. The facility is operating below the limit and if the current permit data had been used to evaluate the need for a limit, the STATS program would not have indicated the need for a limit. In this case, backsliding on a water quality based limit is not allowed and there is no indication of a fundamental change in the characteristics of the facility that would allow an exemption under this criterion. Since all the data were significantly below the whole effluent toxicity limit, the monitoring frequency has been reduced from quarterly to annual.

Table 1 **FACILITY INFORMATION**

FACILITY: GP Big Island, LLC

LOCATION: 9363 Lee Jackson Highway (Big Island)

VPDES PERMIT NUMBER: VA0003026 **Expiration Date:** 06/29/10

SIC CODE/DESCRIPTION: 2631/Paperboard Mill

OUTFALL/FLOWS (MGD) (30 Day Max Ave.): Outfall 001 = 0.12 MGD
Outfall 002 = 3.65 MGD
Outfall 003 = 8.76 MGD

RECEIVING STREAM/CRITICAL FLOWS/IWC:

Receiving Stream:	James River
River Basin:	James River
Subbasin:	NA
Section:	11
Class:	III
Special Standards:	none

Outfall 001	Outfall 002	Outfall 003
7Q10 = 309 MGD	7Q10 = 310 MGD	7Q10 = 312 MGD
1Q10 = 236 MGD	1Q10 = 236 MGD	1Q10 = 239 MGD
30Q5 = 388 MGD	30Q5 = 388 MGD	30Q5 = 397 MGD
IWC = 0.039% (7Q10) (001)	IWC = 2.52% (7Q10)	
IWC = 1.18% 7Q10) (002)	Diffuser Acute Ratio 11:1	
	Chronic Ratio 21:1	

WASTEWATER TREATMENT:

There is no treatment for outfalls 001 or 002. Outfall 003 treatment consists of primary equalization basins, secondary sewage treatment with chlorination, activated sludge, secondary clarifier, and tertiary polishing pond.

TMP REQUIREMENTS (6/05-6/10)

Biological Monitoring

002: Annual acute and chronic tests on 24-hour composite samples alternating between *Ceriodaphnia dubia* and *Pimephales promelas*.

003: A chronic limit of 25.0 TUc was effective on July 1, 2009. Once this limit was effective quarterly acute and chronic test on 24-hour composite samples with *Ceriodaphnia dubia* and *Pimephales promelas* was required.

TOXICITY TEST DATA

Table 2 Chronic Toxicity Test Results for GP Big Island
VPDES Permit No. VA0003026, Outfall 002

Test Date	Test Organism	TU_c	NOEC Survival (%)	NOEC Growth (%)	% Survival in 100% effluent	LC_{50}
Aug 2005 (R)	*P. promelas*	1.0	100	100	100	>100
Aug 2006 (R)	*C. dubia*	1.0	100	100	100	>100
May 2007 (O)	*P. promelas*	1.0	100	100	97.5	>100
Apr 2008 (O)	*C. dubia*	1.0	100	100	100	>100
May 2009 (O)	*P. promelas*	1.0	100	100	97.5	>100

R= testing by REI Consultants; O=Olver Inc.; C= Coastal Bioanalysts, Inc.

TOXICITY TEST DATA

Table 3 Chronic Toxicity Test Results for GP Big Island, VA0003026, Outfall 003

Test Date	Test Organism	TU_c	NOEC % Survival	NOEC % Growth/ Reproduction	LC_{50}
Aug 2005 (R)	*C. dubia*	5.0	100	20	>100
	P. promelas	1.0	100	100	>100
Nov 2005 (R)	*C. dubia*	1.0	100	100	>100
	P. promelas	1.0	100	100	>100
Feb 2006 (R)	*C. dubia*	5.0	100	20	>100
	P. promelas	5.0	20	20	>100
May 2006 (R)	*C. dubia*	5.0	100	20	>100
	P. promelas	5.0	100	20	>100
Aug 2006 (R)	*C. dubia*	5.0	100	20	>100
	P. promelas	5.0	20	20	>100
Dec 2006 (R)	*C. dubia*	5.0	100	20	>100
	P. promelas	1.0	100	100	>100
Apr 2006 (O)	*C. dubia*	5.0	100	20	>100
	P. promelas	1.0	100	100	>100
Oct 2007 (O)	*C. dubia*	1.0	100	100	100
	P. promelas	1.0	100	100	90
Apr 2008 (O)	*C. dubia*	1.0	100	100	>100
	P. promelas	1.0	100	95	>100
Oct 2008 (O)	*C. dubia*	1.0	100	100	>100
	P. promelas	1.0	100	100	>100
Jun 2009 (O)	*C. dubia*	1.0	100	100	>100
	P. promelas	1.0	100	100	>100
Jul 2009 (C)	*C. dubia*	1.0	100	20	>100
	P. promelas	1.0	100	20	>100
Oct 2009 (C)	*C. dubia*	5.0	20	20	48.9
	P. promelas	1.0	100	100	100
Feb 2010 (C)	*C. dubia*	5.0	20	20	>100
	P. promelas	5.0	100	20	>100

R= testing by REI Consultants; O=Olver Inc.; C= Coastal Bioanalysts, Inc.

Outfall 003

Spreadsheet for determination of WET test endpoints or WET limits

	Excel 97			**Acute Endpoint/Permit Limit**			**Use as LC_{50} in Special Condition, as TUa on DMR**					
	Revision Date: 01/10/05											
	File: WETLIM10.xls			ACUTE	3.071406836	TUa		LC_{50} =	33	% Use as	3.03	TUa
	(MIX.EXE required also).											
				ACUTE WLAa		3.3	Note: Inform the permittee that if the mean of the data exceeds					
							this TUa:	1.0	a limit may result using WLA.EXE			
				Chronic Endpoint/Permit Limit			**Use as NOEC in Special Condition, as TUc on DMR**					
				CHRONIC	30.71406836	TU_c	NOEC =	4	% Use as	25.00	TU_c	
				BOTH*	33.00000081	TU_c	NOEC =	4	% Use as	25.00	TU_c	
Enter data in the cells with blue type:				AML	30.71406836	TU_c	NOEC =	4	% Use as	25.00	TU_c	
Entry Date:		03/16/10		ACUTE WLAa,c		33		Note: Inform the permittee that if the mean				
Facility Name:		GP Big Island		CHRONIC WLAc		21		of the data exceeds this TUc:			12.6217827	
VPDES Number:		VA0003026		* Both means acute expressed as chronic				a limit may result using WLA.EXE				
Outfall Number:		003										
				% Flow to be used from MIX.EXE				Difuser /modeling study?				
Plant Flow:		8.76	MGD					Enter Y/N	Y			
Acute 1Q10:		289	MGD	100	%			Acute	11	:1		
Chronic 7Q10:		312	MGD	100	%			Chronic	21	:1		
Are data available to calculate CV? (Y/N)				N	(Minimum of 10 data points, same species, needed)					Go to Page 2		
Are data available to calculate ACR? (Y/N)				N	(NOEC<LC50, do not use greater/less-than data)					Go to Page 3		
IWC_a		9.090909091	%	Plant flow/plant flow + 1Q10		**NOTE: If the IWCa is >33%, specify the**						
IWC_c		4.761904762	%	Plant flow/plant flow + 7Q10		**NOAEC = 100% test/endpoint for use**						
Dilution, acute		11	100/IWCa									
Dilution, chronic		21	100/IWCc									
WLA_a		3.3	Instream criterion (0.3 TUa) X's Dilution, acute									
WLA_c		21	Instream criterion (1.0 TUc) X's Dilution, chronic									
$WLA_{a,c}$		33	ACR X's WLA_a - converts acute WLA to chronic units									
ACR -acute/chronic ratio		10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)									
CV-Coefficient of variation		0.6	Default of 0.6 - if data are available, use tables Page 2)									
Constants	eA	0.4109447	Default = 0.41									
	eB	0.6010373	Default = 0.60									
	eC	2.4334175	Default = 2.43									
	eD	2.4334175	Default = 2.43 (1 samp)		No. of sample:	1	****The Maximum Daily Limit is calculated from the lowest**					
							LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.					
$LTA_{a,c}$		13.5611751	WLAa,c X's eA									
LTA_c		12.6217833	WLAc X's eB							Rounded NOEC's		%
MDL** with $LTA_{a,c}$		33.00000081	TU_c	NOEC =	3.030303	(Protects from acute/chronic toxicity)				NOEC =	4	%
MDL** with LTA_c		30.71406836	TU_c	NOEC =	3.255837	(Protects from chronic toxicity)				NOEC =	4	%
AML with lowest LTA		30.71406836	TU_c	NOEC =	3.255837	Lowest LTA X's eD				NOEC =	4	
IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a												
										Rounded LC50's		%
MDL with $LTA_{a,c}$		3.300000081	TU_a	LC50 =	30.303030	%				LC50 = .	31	%
MDL with LTA_c		3.071406836	TU_a	LC50 =	32.558370	%				LC50 =	33	

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT					Vertebrate			Invertebrate	
ARE QUANTIFIABLE (NOT "<" OR ">")					IC_{25} Data			IC_{25} Data	
FOR A SPECIES, ENTER THE DATA IN EITHER					or			or	
COLUMN "G" (VERTEBRATE) OR COLUMN					LC_{50} Data	LN of data		LC_{50} Data	LN of data
"J" (INVERTEBRATE). THE 'CV' WILL BE					***********			************	
PICKED UP FOR THE CALCULATIONS				1	0		1	0	
BELOW. THE DEFAULT VALUES FOR eA,				2			2		
eB, AND eC WILL CHANGE IF THE 'CV' IS				3			3		
ANYTHING OTHER THAN 0.6.				4			4		
				5			5		
				6			6		
				7			7		
Coefficient of Variation for effluent tests				8			8		
				9			9		
CV =	0.6	(Default 0.6)		10			10		
				11			11		
δ^2 =	0.3074847			12			12		
δ =	0.554513029			13			13		
				14			14		
Using the log variance to develop eA				15			15		
	(P. 100, step 2a of TSD)			16			16		
Z = 1.881 (97% probability stat from table				17			17		
A =	-0.88929666			18			18		
eA =	0.410944686			19			19		
				20			20		
Using the log variance to develop eB									
	(P. 100, step 2b of TSD)			St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA	NEED DATA
δ_4^2 =	0.086177696			Mean	0	0	Mean	0	0
δ_4 =	0.293560379			Variance	0	0.000000	Variance	0	0.000000
B =	-0.50909823			CV	0		CV	0	
eB =	0.601037335								
Using the log variance to develop eC									
	(P. 100, step 4a of TSD)								
δ^2 =	0.3074847								
δ =	0.554513029								
C =	0.889296658								
eC =	2.433417526								
Using the log variance to develop eD									
	(P. 100, step 4b of TSD)								
n =	1	This number will most likely stay as "1", for 1 sample/month.							
δ_n^2 =	0.3074847								
δ_n =	0.554513029								
D =	0.889296658								
eD =	2.433417525								

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	37	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	37	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	37	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	100	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	100	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	100	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	100	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	100	#N/A	#N/A	#N/A	#N/A	NO DATA
9	83.7	50	1.674	0.515216	#N/A	#N/A	NO DATA
10	#N/A	25	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Convert LC_{50}'s and NOEC's to Chronic TU's

for use in WLA.EXE

Table 3. **ACR used: 10**

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50, enter it here:

enter it here:	NO DATA	$\%LC_{50}$
	NO DATA	TUa

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring % Effluent	Monitoring TUc	Limit % Effluent	Limit TUc
Dilution series based on data mean	7.9	12.621783		
Dilution series to use for limit			4	25
Dilution factor to recommend:	0.2814749		0.2	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	28.1	3.55	20.0	5.00
	7.9	12.62	4.0	25.00
	2.2	44.84	0.8	125.00
	0.63	159.31	0.2	625.00
Extra dilutions if needed	0.18	565.98	0.0	3125.00
	0.05	2010.77	0.0	15625.00

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUa. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C138
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

2/23/2010 3:09:54 PM

Facility = GP Big Island (Outfall 003)
Chemical = Whole Effluent Toxicity (T.U.)
Chronic averaging period = 4
WLAa = 33
WLAc = 21
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 100
Variance = 3600
C.V. = 0.6
97th percentile daily values = 243.341
97th percentile 4 day average = 166.379
97th percentile 30 day average= 120.605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 30.7140704651179
Average Weekly limit = 30.7140704651179
Average Monthly LImit = 30.7140704651179

The data are:

100

Attachment L

NPDES Permit Rating Worksheet

NPDES PERMIT RATING WORK SHEET

☐ Regular Addition
☐ DiscretionaryAddition
☐ Score change, but no status change
☐ Deletion

NPDES NO. VA0003026

Facility Name: GP – Big Island, LLC

City: Big Island

Receiving Water: James River; Reed Creek, UT: Thomas Mill Creek, UT

Reach Number: ______

Is this facility a steam electric power plant (SIC=4911) with one or more of the following characteristics?
1. Power output 500 MW or greater (not using a cooling pond/lake)
2. A nuclear power plant
3. Cooling water discharge greater than 25% of the receiving stream's 7Q10 flow rate

☐ YES; score is 600 (stop here) ■ NO (continue)

Is this permit for a municipal separate storm sewer serving a population greater than 100,000?

☐ YES; score is 700 (stop here)
■ NO (continue)

FACTOR 1: Toxic Pollutant Potential

PCS SIC Code: _____ Primary SIC Code: 2631 Other SIC Codes: 4911, 4952, 4953
Industrial Subcategory Code: 2, 21 (Code 000 if no subcategory)

Determine the Toxicity potential from Appendix A. Be sure to use the TOTAL toxicity potential column and check one)

Toxicity Group	Code	Points	Toxicity Group	Code	Points	Toxicity Group	Code	Points
☐ No process waste streams	0	0	☐ 3.	3	15	☐ 7.	7	35
☐ 1.	1	5	☐ 4.	4	20	☐ 8.	8	40
☐ 2.	2	10	☐ 5.	5	25	☐ 9.	9	45
			■ 6.	6	30	☐ 10.	10	50

Code Number Checked: 6

Total Points Factor 1: 30

FACTOR 2: Flow/Stream Flow Volume *(Complete either Section A or Section B; check only one)*

Section A ☐ Wastewater Flow Only Considered

Wastewater Type (See Instructions)		Code	Points
Type I: Flow < 5 MGD	☐	11	0
Flow 5 to 10 MGD	☐	12	10
Flow > 10 to 50 MGD	☐	13	20
Flow > 50 MGD	☐	14	30
Type II: Flow < 1 MGD	☐	21	10
Flow 1 to 5 MGD	☐	22	20
Flow > 5 to 10 MGD	☐	23	30
Flow > 10 MGD	☐	24	50
Type III: Flow < 1 MGD	☐	31	0
Flow 1 to 5 MGD	☐	32	10
Flow > 5 to 10 MGD	☐	33	20
Flow > 10 MGD	☐	34	30

Section B ☐ Wastewater and Stream Flow Considered

Wastewater Type (See Instructions)	Percent of instream Wastewater Concentration at Receiving Stream Low Flow		Code	Points
Type I/III:	< 10 %	☐	41	0
	10 % to < 50 %	☐	42	10
	> 50 %	☐	43	20
Type II:	< 10 %	■	51	0
	10 % to <50 %	☐	52	20
	> 50 %	☐	53	30

Code Checked from Section A or B: 51
Total Points Factor 2: 0

FACTOR 3: Conventional Pollutants NPDES NO: VA0003026
(only when limited by the permit)

A. Oxygen Demanding Pollutant: (check one) ☒ BOD ☐ COD ☐ Other:____________________

Permit Limits: (check one)			Code	Points
	☐	< 100 lbs/day	1	0
	☐	100 to 1000 lbs/day	2	5
	☐	> 1000 to 3000 lbs/day	3	15
	☒	> 3000 lbs/day	4	20

Code Checked: _4__

Points Scored:_20___

B. Total Suspended Solids (TSS)

Permit Limits: (check one)			Code	Points
	☐	< 100 lbs/day	1	0
	☐	100 to 1000 lbs/day	2	5
	☐	> 1000 to 5000 lbs/day	3	15
	☒	> 5000 lbs/day	4	20

Code Checked: __4__

Points Scored: __20__

C. Nitrogen Pollutant: (check one) ☐ Ammonia ☐ Other: ____________________

Permit Limits: (check one)		*Nitrogen Equivalent*	*Code*	*Points*
	☐	< 300 lbs/day	1	0
	☐	300 to 1000 lbs/day	2	5
	☐	> 1000 to 3000 lbs/day	3	15
	☐	> 3000 lbs/day	4	20

Code Checked: __NA_

Points Scored:__0__

Total Points Factor 3: __40__

FACTOR 4: Public Health Impact

Is there a public drinking water supply located within 50 miles downstream of the effluent discharge (this includes any body of water to which the receiving water is a tributary)? A public drinking water supply may include infiltration galleries, or other methods of conveyance that ultimately get water from the above referenced supply.

☒ YES (If yes, check toxicity potential number below)

☐ NO (If no, go to Factor 5)

Determine the *human health* toxicity potential from Appendix A. Use the same SIC code and subcategory reference as in Factor 1. (Be sure to use the <u>human health</u> toxicity group column ☐ check one below)

Toxicity Group	Code	Points	Toxicity Group	Code	Points	Toxicity Group	Code	Points
☐ No process waste streams	0	0	☐ 3.	3	0	☐ 7.	7	15
☐ 1.	1	0	☐ 4.	4	0	☐ 8.	8	20
☒ 2.	2	0	☐ 5.	5	5	☐ 9.	9	25
			☐ 6.	6	10	☐ 10.	10	30

Code Number Checked: _2_

Total Points Factor 4:_0

FACTOR 5: Water Quality Factors NPDES NO. VA0003026

A. Is (or will) one or more of the effluent discharge limits based on water quality factors of the receiving stream (rather than technology-based federal effluent guidelines, or technology-based state effluent guidelines), or has a wasteload allocation been assigned to the discharge:

		Code	Points
☒	Yes	1	10
☐	No	2	0

B. Is the receiving water in compliance with applicable water quality standards for pollutants that are water quality limited in the permit?

		Code	Points
☒	Yes	1	0
☐	No	2	5

C. Does the effluent discharged from this facility exhibit the reasonable potential to violate water quality standards due to whole effluent toxicity?

		Code	Points
☒	Yes	1	10
☐	No	2	0

Code Number Checked: A 1 B 1_ C 1_

Points Factor 5: A 10 + B 0 + C 10 = 20 TOTAL

FACTOR 6: Proximity to Near Coastal Waters

A. Base Score: Enter flow code here (from Factor 2): 51 *Enter the multiplication factor that corresponds to the flow code: 0.10*

Check appropriate facility HPRI Code (from PCS):

	HPRI#	*Code*	*HPRI Score*
☐	1	1	20
☐	2	2	0
☐	3	3	30
☒	4	4	0
☐	5	5	20

Flow Code	*Multiplication Factor*
11, 31, or 41	0.00
12, 32, or 42	0.05
13, 33, or 43	0.10
14 or 34	0.15
21 or 51	0.10
22 or 52	0.30
23 or 53	0.60
24	1.00

HPRI code checked: __

Base Score: (HPRI Score) 0 X (Multiplication Factor) 0.1 = 0 (TOTAL POINTS)

B. Additional Points ☐ NEP Program
For a facility that has an HPRI code of 3, does the facility discharge to one of the estuaries enrolled in the National Estuary Protection (NEP) program (see instructions) or the Chesapeake Bay?

		Code	Points
☐	Yes	1	10
☒	No	2	0

C. Additional Points ☐ Great Lakes Area of Concern
For a facility that has an HPRI code of 5, does the facility discharge any of the pollutants of concern into one of the Great Lakes' 31 areas of concern (see Instructions)

		Code	Points
☐	Yes	1	10
☒	No	2	0

Code Number Checked: A 4 B 2 C 2_

Points Factor 6: A 0 + B 0 + C 0 = 0 TOTAL

SCORE SUMMARY

NPDES NO. VA0003026

Factor	Description	Total Points
1	Toxic Pollutant Potential	30
2	Flows/Streamflow Volume	0
3	Conventional Pollutants	40
4	Public Health Impacts	0
5	Water Quality Factors	20
6	Proximity to Near Coastal Waters	0
	TOTAL (Factors 1 through 6)	90

S1. Is the total score equal to or greater than 80? ☒ Yes (Facility is a major) ☐ No

S2. If the answer to the above questions is no, would you like this facility to be a discretionary major? NA

☐ No

☐ Yes (Add 500 points to the above score and provide reason below:

Reason:

NEW SCORE: 90

OLD SCORE: 90

Becky L. France
Permit Reviewer's Name

(540) 562-6700
Phone Number

2/23/10
Date

Attachment M

Public Notice

Public Notice - Environmental Permit

PURPOSE OF NOBICE: to seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater and storm water into a water body in Bedford County, Virginia.
PUBLIC COMMENT PERIOD: 30 days following the public notice issue date; comment period ends 4:30 pm on last day
PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater and Storm Water issued by DEQ under the authority of the State Water Control Board
APPLICANT NAME, ADDRESS, AND PERMIT NUMBER: GP Big Island, LLC; PO Box 40, Big Island, VA 24526, VA0003026
PROJECT DESCRIPTION: GP Big Island, LLC has applied for a reissuance of a permit for the private GP Big Island facility. The applicant proposes to release storm water and an average of 12.53 million gallons per day of treated industrial wastewater. Sludge from the industrial treatment process will be disposed of by hauling to the facility's industrial landfill. Sewage sludge will be disposed of by hauling to a municipal wastewater treatment facility. The facility proposes to release the treated industrial wastewaters and storm water into the following receiving streams which are in the Upper James River watershed (VAW-H01R). A watershed is the land area drained by a river and its incoming streams. The permit will limit pollutants to amounts that protect water quality: organic matter, solids, heat, and color.

Receiving Streams	River Miles	Total Outfalls
James River	277.57-278.89	15
James River, UT	0.12-0.34	2
Thomas Mill Creek, UT	0.28	1
Reed Creek	0.01	1
Reed Creek, UT	0.81	1

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax, or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for a public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor or those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.
CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS, AND ADDITIONAL INFORMATION: Becky L. France; Virginia Department of Environmental Quality, Blue Ridge Regional Office, 3019 Peters Creek Road, Roanoke, VA 24019-2738; PHONE: (540) 562-6700; E-MAIL ADDRESS: becky.france@deq.virginia.gov; FAX: (540) 562-6725. The public may review the draft permit and application at the DEQ office named above by appointment or may request copies of the documents from the contact person listed above.

Attachment N

EPA Checksheet

Revised 2/2003

State "FY2003 Transmittal Checklist" to Assist in Targeting Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name: GP Big Island, LLC

NPDES Permit Number: VA0003026

Permit Writer Name: Becky L. France

Date: 2/23/10

Major [X] **Minor [ ]** **Industrial [X]** **Municipal [ ]**

I.A. Draft Permit Package Submittal Includes:	Yes	No	N/A
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?		X	
8. Whole Effluent Toxicity Test summary and analysis?	X		
9. Permit Rating Sheet for new or modified industrial facilities?	X		

I.B. Permit/Facility Characteristics	Yes	No	N/A
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		

I.B. Permit/Facility Characteristics – cont. (FY2003)	Yes	No	N/A
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?	X		
6. Does the permit allow the discharge of new or increased loadings of any pollutants?	X		
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water? PCBs	X		
a. Has a TMDL been developed and approved by EPA for the impaired water?		X	
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?	X		
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water? PCB data required from facility in permit		X	
9. Have any limits been removed, or are any limits less stringent, than those in the current permit? TRC removed because chlorine not used for 001 or 002	X		
10. Does the permit authorize discharges of storm water?	X		
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production? some increase in flow for outfall 003	X		
12. Are there any production-based, technology-based effluent limits in the permit?	X		
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria? Chronic WET limit	X		
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations? thermal mixing zone	X		
16. Does the permit contain a compliance schedule for any limit or condition?	X		
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		X	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?			X
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist (FY2003)

Region III NPDES Permit Quality Checklist – for POTWs
(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?			X

II.C. Technology-Based Effluent Limits (POTWs)	Yes	No	N/A
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?			X

II.D. Water Quality-Based Effluent Limits – cont. (FY2003)	Yes	No	N/A
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?	X		
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			X
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?	X		

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?	X		

II.F. Special Conditions – cont. (FY2003)	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?	X		
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?			X
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?	X		

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		

List of Standard Conditions – 40 CFR 122.41

Duty to comply	Property rights	Reporting Requirements
Duty to reapply	Duty to provide information	Planned change
Need to halt or reduce activity not a defense	Inspections and entry	Anticipated noncompliance
Duty to mitigate	Monitoring and records	Transfers
Proper O & M	Signatory requirement	Monitoring reports
Permit actions	Bypass	Compliance schedules
	Upset	24-Hour reporting
		Other non-compliance

	Yes	No	N/A
2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part II. NPDES Draft Permit Checklist (FY2003)

Region III NPDES Permit Quality Review Checklist – For Non-Municipals
(To be completed and included in the record for all non-POTWs)

II.A. Permit Cover Page/Administration	**Yes**	**No**	**N/A**
1. Does the fact sheet **or** permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	**Yes**	**No**	**N/A**
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?	X		

II.C. Technology-Based Effluent Limits (Effluent Guidelines & BPJ)	**Yes**	**No**	**N/A**
1. Is the facility subject to a national effluent limitations guideline (ELG)?	X		
a. If yes, does the record adequately document the categorization process, including an evaluation of whether the facility is a new source or an existing source?	X		
b. If no, does the record indicate that a technology-based analysis based on Best Professional Judgement (BPJ) was used for all pollutants of concern discharged at treatable concentrations?			X
2. For all limits developed based on BPJ, does the record indicate that the limits are consistent with the criteria established at 40 CFR 125.3(d)?	X		
3. Does the fact sheet adequately document the calculations used to develop both ELG and /or BPJ technology-based effluent limits?	X		
4. For all limits that are based on production or flow, does the record indicate that the calculations are based on a "reasonable measure of ACTUAL production" for the facility (not design)?	X		
5. Does the permit contain "tiered" limits that reflect projected increases in production or flow?		X	
a. If yes, does the permit require the facility to notify the permitting authority when alternate levels of production or flow are attained?			X
6. Are technology-based permit limits expressed in appropriate units of measure (e.g., concentration, mass, SU)?	X		

II.C. Technology-Based Effluent Limits (Effluent Guidelines & BPJ) – cont.	Yes	No	N/A
7. Are all technology-based limits expressed in terms of both maximum daily, weekly average, and/or monthly average limits?	X		
8. Are any final limits less stringent than required by applicable effluent limitations guidelines or BPJ?		X	

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the record indicate that any WQBELs were derived from a completed and EPA approved TMDL?			X
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations where data are available)?	X		
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term (e.g., average monthly) AND short-term (e.g., maximum daily, weekly average, instantaneous) effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the fact sheet indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

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II.E. Monitoring and Reporting Requirements (FY2003)	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			X
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require testing for Whole Effluent Toxicity in accordance with the State's standard practices?	X		

II.F. Special Conditions	Yes	No	N/A
1. Does the permit require development and implementation of a Best Management Practices (BMP) plan or site-specific BMPs?	X		
a. If yes, does the permit adequately incorporate and require compliance with the BMPs?	X		
2. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?	X		
3. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		

List of Standard Conditions – 40 CFR 122.41

Duty to comply	Property rights	Reporting Requirements
Duty to reapply	Duty to provide information	Planned change
Need to halt or reduce activity not a defense	Inspections and entry	Anticipated noncompliance
	Monitoring and records	Transfers
Duty to mitigate	Signatory requirement	Monitoring reports
Proper O & M	Bypass	Compliance schedules
Permit actions	Upset	24-Hour reporting
		Other non-compliance

	Yes	No	N/A
2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for existing non-municipal dischargers regarding pollutant notification levels [40 CFR 122.42(a)]?	X		

Part III. Signature Page (FY2003)

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Becky L. France
Title	Environmental Engineer Senior
Signature	Becky L. France
Date	2/23/10